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The AIRCRAFT ENGINEER AND AIRSHIPS

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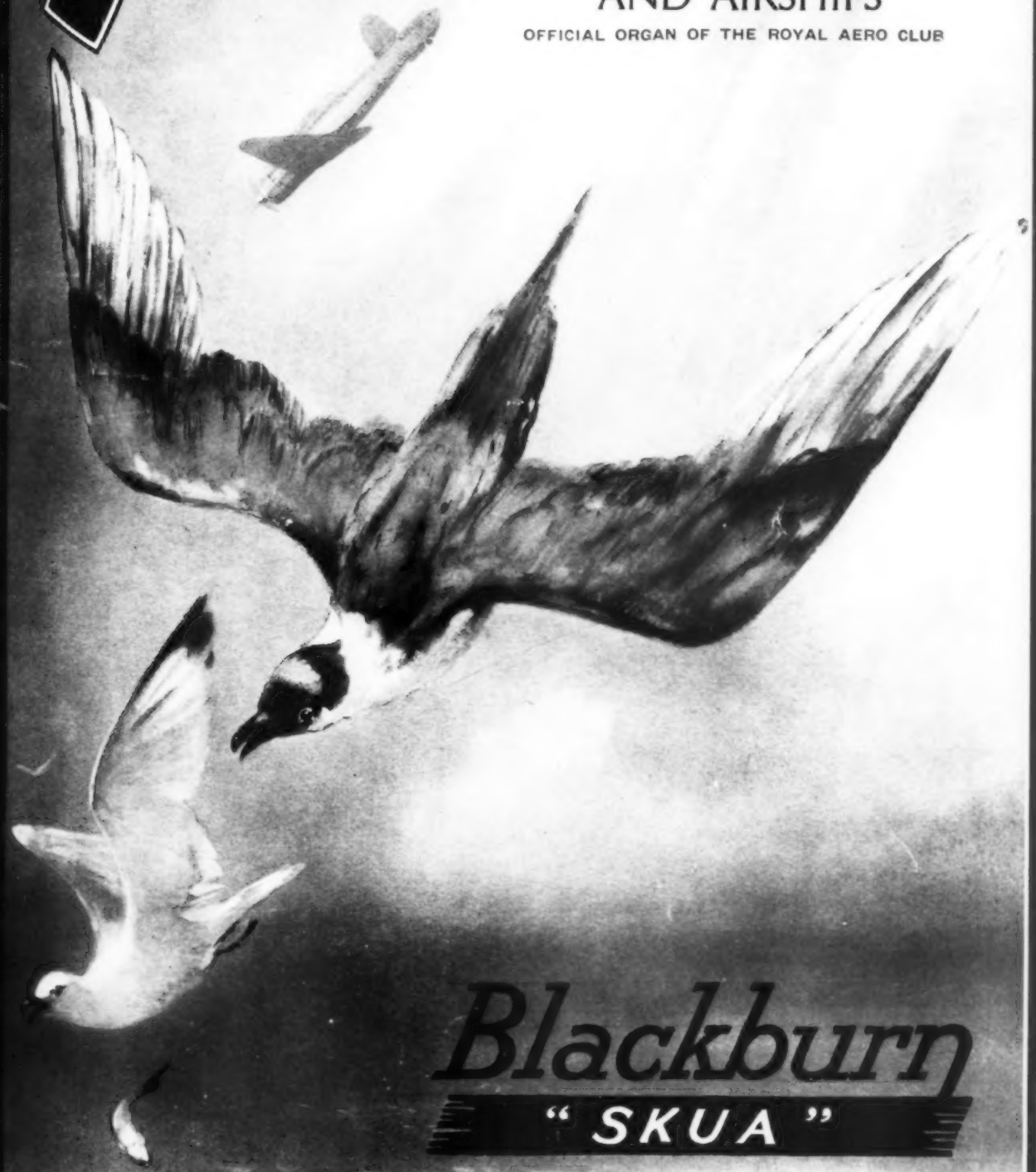

Blackburn "SKUA"

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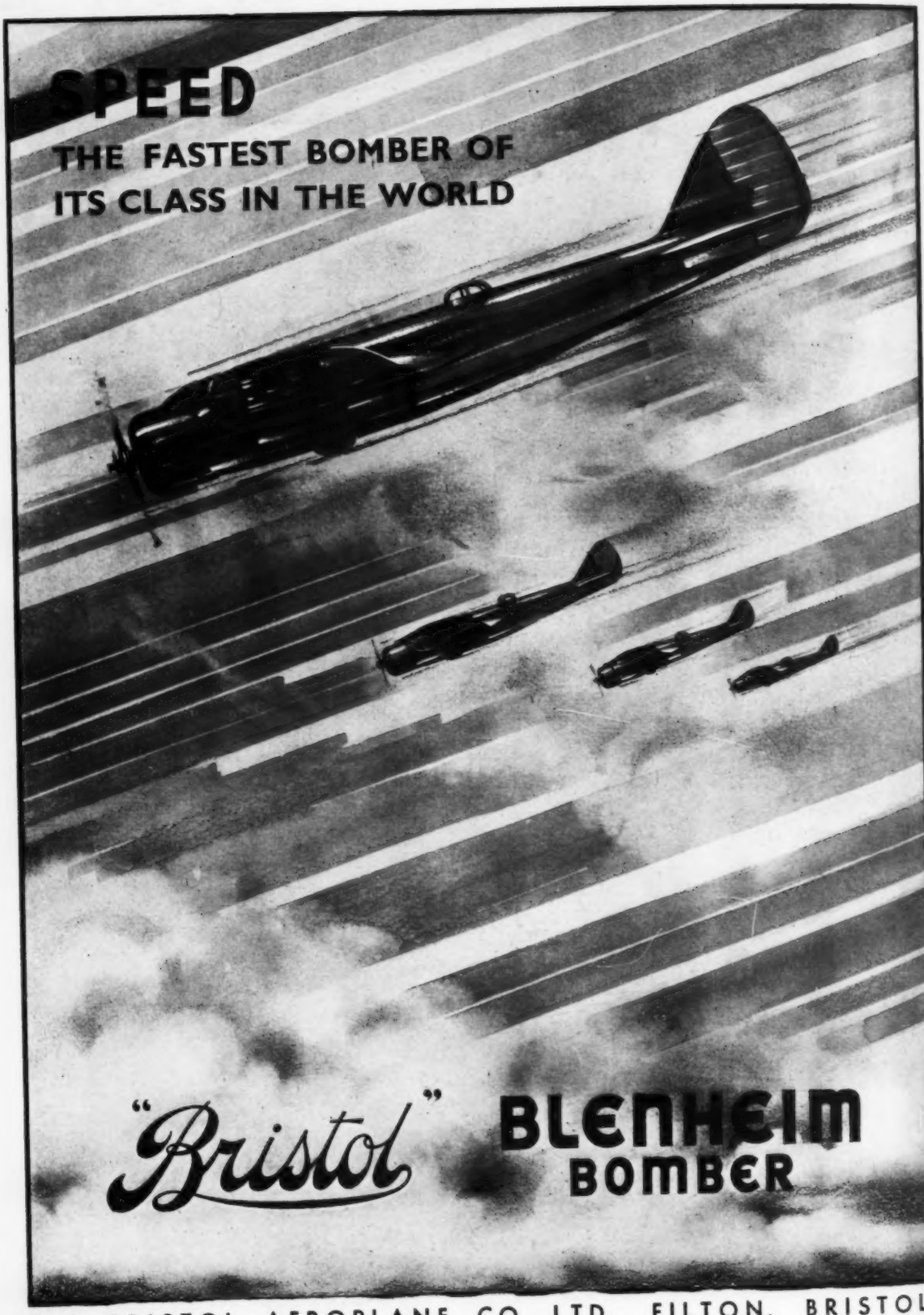

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FLIGHT

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The Outlook

Atlantic Projectiles

POSSIBILITIES of carrying reasonable payloads over long non-stop distances continue to be the forefront of immediate problems, and recent developments have made it possible to foresee, if somewhat vaguely, the lines along which further progress may march.

In this issue is a detailed description of the Short-Mayo composite aircraft, the components of which made their first separation successfully a couple of weeks ago. The fundamental principle of the composite aircraft is explained in the article, but other aspects deserve some consideration. It is a basic necessity in the Mayo scheme to use a larger, lightly-loaded aircraft for assisting into the air a smaller, heavily-loaded one. From this it would seem to follow, *ipso facto*, that the special function of the composite aircraft will be to provide transport of relatively small, concentrated loads over long distances at very great speed. Mails across the Atlantic at 300 m.p.h. or more, with several flights every day in both directions, is the obvious application.

America is planning "sub-stratosphere" flying for the near future. The composite appears to work into such a scheme very nicely, as the engines of the upper component may have a rated height of about 20,000 ft. while those of the lower component may be supercharged to a smaller degree. By this combination, the need for two-stage superchargers may be avoided, the lower component doing most of the work from sea level to 10,000 ft., when the engines of the upper can begin to take over an increasing share. Long-range bombing, at extremely high speed and possibly with a relatively small bomb load, may, perhaps, be assumed to be the military application.

Direct Take-off

WHEN it comes to large aircraft, it appears likely different lines of development may be followed. Alternatives to the composite aircraft are the catapult and refuelling in the air. For military aircraft the catapult will always have its applications. The crews can be trained to stand considerable accelerations, and the risk of engine failure immediately after the launch may be counted one which crews of military aircraft must be prepared to accept as one of their ordinary service risks.

Fare-paying passengers in commercial aircraft can hardly be expected to put up with being hurled into the air by catapult, although the accelerator type of launching may find applications in civil aviation. The fact that the eight new flying boats ordered by Imperial Airways from Short Brothers are, as announced last week, being strengthened in order to increase their permissible gross weight to 53,000 lb., indicates the expectation that (a) they will take off under their own power at this weight, or (b) that they will be refuelled in the air shortly after the start.

Reliability and complete absence of forced landings must obviously be a *sine qua non* in Atlantic operations. That means that the boats must be capable of flying with any one of the four engines out of action; not only so, but flight must be possible with the remaining three engines running at less than full power. From this it follows that the power reserve will have to be very considerable. So much so that unassisted take-off will almost certainly be possible for any type of aircraft which is fit for the work of transatlantic operation.

"Topping-up"

WHICHEVER method of getting into the air is adopted, range for a given payload, or payload for a given range, will always be the commercial yardstick by which the practical utility of an Atlantic aircraft is measured. It is for this reason that refuelling in the air also comes into the picture. It will nearly always be the case that, as a famous comedian used to sing, "another little drop wouldn't do us any harm."

Refuelling in the air can be said to have reached the stage of being perfectly feasible whenever visibility is such as to make it possible for the two aircraft to locate one another. The Atlantic termini at Foynes and Botwood will probably provide such visibility for a very high percentage of scheduled flights, so that should it be found desirable to "top-up" with fuel when the machines have taken off under their own power, there should be no technical difficulty.

One aspect of long-range flights does not seem to have received the attention it deserves. The diesel engine has lost ground as a result of the improvement in fuel con-

THE OUTLOOK (CONTINUED)

sumption of the modern petrol engine, made possible by the use of fuels of high octane value. This is the case to such an extent that flights of very long duration have to be made before the diesel can compete on a basis of engine-plus-fuel weight.

More serious is the fact that the diesel does not give that extra power for short periods which is such a useful attribute of the petrol engine, and which provides the aircraft designer with a much-needed power reserve for the take-off. The assisted take-off, or the refuelling after take-off, would get over this disability of the diesel engine. The result might well be that the diesel became eligible for transatlantic operation. Not only would the diesel fuel be a great deal cheaper than petrol, but the risk of fire during the actual aerial refuelling operation would probably be reduced. It is conceivable that a broken feed-line might cause a fire by discharging petrol in large quantities close to running engines. With diesel oil there would, presumably, be less danger of this happening.

As *Flight* said many months ago, when reviewing the different means available for increasing the range and pay-load of aircraft, there will be room for them all. The technical problems are solved. There remains the practical application in the most logical way.

In a Hurricane

ON occasions the Royal Air Force can be a very good publicity agent. When Press and Parliament are spasmodically showing signs of uneasiness about the progress of re-equipment, and are murmuring about delays in the production of new types of aircraft, some striking demonstration of progress was obviously called for to show that everything was not so behindhand as the pessimists would have the public believe.

A northerly gale provided the opportunity, and the R.A.F. seized it. Sqn. Ldr. J. W. Gillan, the C.O. of No. 111 (Fighter) Squadron, took his Hurricane up to Turnhouse, and with the 50 m.p.h. wind more or less behind his tail flew it down to his home station of Northolt in forty-eight minutes at a speed of 409 m.p.h.

The Air Ministry sat up late that evening, and issued a sparkling statement which pointed out that the Hurricane had flown considerably faster than the 379.17 m.p.h. of the German pilot, Capt. Würster, when he set up the world's landplane record on November 11. Naturally, the Air Ministry did not draw attention to the rule that speed records, for official recognition, have to be flown twice in each direction over a three-kilometre course so as to equalise the effect of the wind.

It is, of course, startling that anybody should be able to get from Edinburgh to Middlesex in just over three-quarters of an hour, and nobody can justly blame the Air Ministry for laying some stress on the performance. Actually, however, the speed of the journey was, in the circumstances (i.e., the wind), the least remarkable part of the performance. As a feat of navigation this flight was very highly creditable to the pilot, for he flew high and in the dark, finding his way almost entirely by his instruments. The flight is also a great testimony to the qualities of the Hawker Hurricane, which has proved itself not merely a very fast aeroplane but one quite suitable for night duties. That is a great point in a modern high-speed fighter.

Case for Authority

DURING the war, when discipline in some of the fighting Services got slack and life was reckoned very cheap, some youthful pilots made a great nuisance of themselves. Bright young spirits thought it excellent fun to frighten animals or people by diving at them, and so on.

It might have been thought that with the strict discipline now enforced in the R.A.F. all such pastimes as "shooting-up" had gone out of fashion, but, according to the coroner of Epping, this is not the case. It seems from the reports of the inquest held on P/O. Austin Sparks last Monday, that a flight of single-seater fighters at Hornchurch had broken formation, presumably in order to land, when another fighter from North Weald, a machine of a slower type, flew over Hornchurch aerodrome. The Pilot Officers of the Hornchurch squadron then seem to have amused themselves by diving at the slower machine and flying behind its tail. The officer who was in command of the flight, a Flying Officer with the acting rank of Flight Lieutenant, was 500ft. above the rest, and when he saw the other three machines manœuvring he says he went down to recall the flight. A collision occurred between his machine and that of one of the Pilot Officers. The Flight Lieutenant got down safely by parachute, but P/O. Austin Sparks was killed.

ST. MORITZ STUDY
A fine impression of a Swissair Douglas D.C.2 taking off from the new "fine-weather" airport at Samaden (5,500 ft. above sea level), which is proving so useful to winter sports visitors to St. Moritz.

The coroner remarked: "It seems that this young man's life was lost as a result of a somewhat foolish and, may I say, somewhat reckless exhibition of youthful exuberance on the part of other members in that flight." Accepting the facts as related, one cannot blame the flight commander for going down to stop the ragging if he was unable to recall his flight by radio telephony, although it was this action of his which seems to have resulted in the collision.

No doubt the higher authorities of the Air Force will take appropriate action to prevent a repetition of such a tragedy as this. Fighter pilots in particular are expected to be men of high spirits and of daring character, but discipline must keep such admirable qualities within bounds.

One cannot help wondering whether occasional outbursts of exuberance by young pilots are not due in a measure to the present paucity of older and senior officers in the R.A.F. squadrons. The youthfulness of many squadron commanders in the war certainly did not make for rigid discipline at that time. In such connections, of course, youth is a handicap which only time can remedy; but higher authority can ensure that discipline will be maintained.

Blacking-Out

IN the Great War the chief harm done to Britain by the German air raids was the interruption to industry and especially to the output of war munitions caused by the air raid warnings. According to the latest Home Office memorandum on air raid precautions, the whole country will be permanently blacked-out, so far as is possible, if another war should break out. It seems a tremendous undertaking, and one likely to slow down manufacture very considerably. On the other hand, it may so increase the confidence of factory workers at night that the total diminution of output may well be less than when an air raid warning kept the workers away from a factory all night.

The memorandum recognises that some works of national importance cannot be completely blacked-out. Certain types of furnaces, for example, are hard to conceal, and they must be kept going continuously. It seems that the workers in such cases will have to take their chance. Despite the very great improvement in bomb sights and generally in the art of bombing since 1918, it may be taken as true that the greater the height of the bomber the less chance there is of his scoring a bull's-eye. We can at least feel sure that modern means of defence will keep the bombers up very high. The A.A. guns and searchlights now have a much greater range, the fighters have a wonderful rate of climb, and then there will be balloon barrages. These last ought to ensure that the raiders who have come in at a great height will not be able to come down low over their target before bombing.

Compromise?

IT should be recognised that complete darkness will not protect all places. Water will nearly always give away a locality, and it should always be possible for raiders to find their way to London, though not necessarily to distinguish a particular target in London. It would probably also be impossible to prevent the raider from identifying Portsmouth and Southampton.

Darkness would seem to be most useful in concealing inland centres such as Birmingham or Coventry. There would be small wisdom in causing a great deal of inconvenience to places which can be easily identified in any case. If a raid takes place, rules ought not to be too rigid just because they are rules If incendiary bombs are dropped and fires are started in a town, there would then be no reason for denying a reasonable amount of light to the parties which have to attend to casualties, decontaminate streets, and carry out other essential work. To leave these people without light to work by might cause as much preventable damage as would be caused by the dropping of another bomb.

DIARY OF FORTHCOMING EVENTS—Page 156.

Indoor Flying

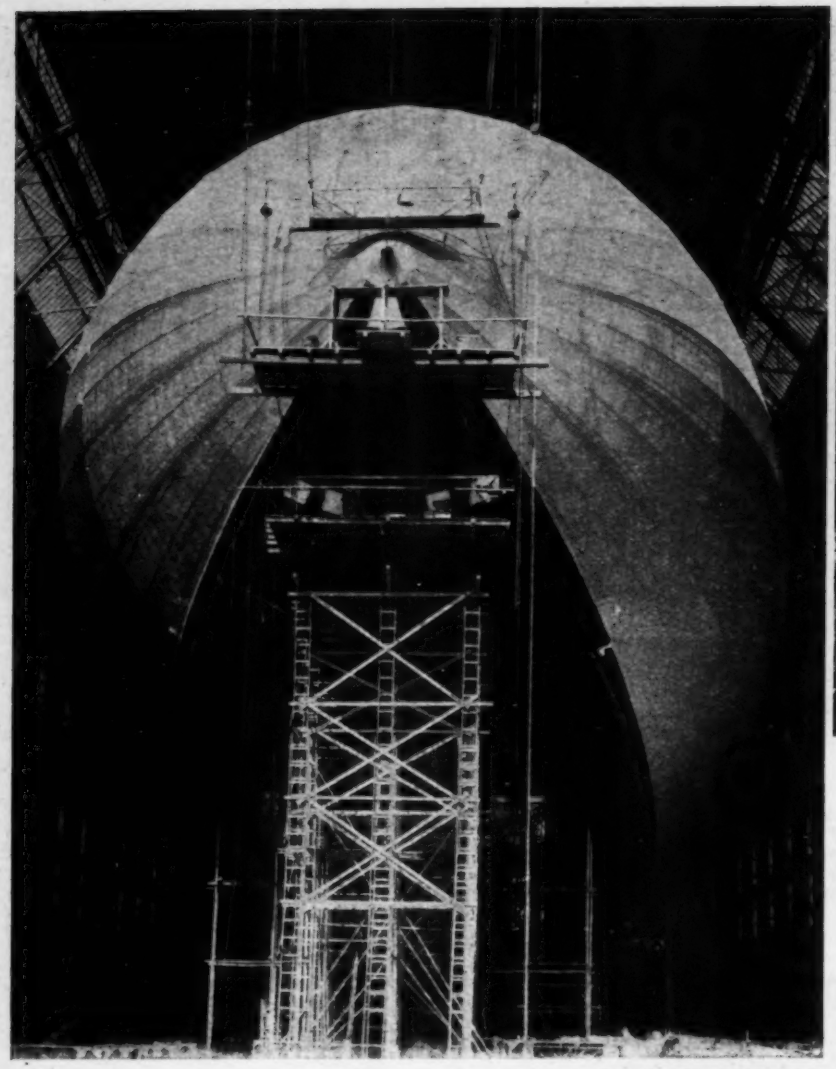
ALMOST from the earliest days of flying the possibility of raising a weight into the air by a lifting airscrew has been realised. What has held back the development of the helicopter has been the problems connected with controlling the helicopter after it had got into the air. Dozens of helicopters have been built during the last twenty years or so, but most of them have come to grief sooner or later as a result of defective or inadequate control.

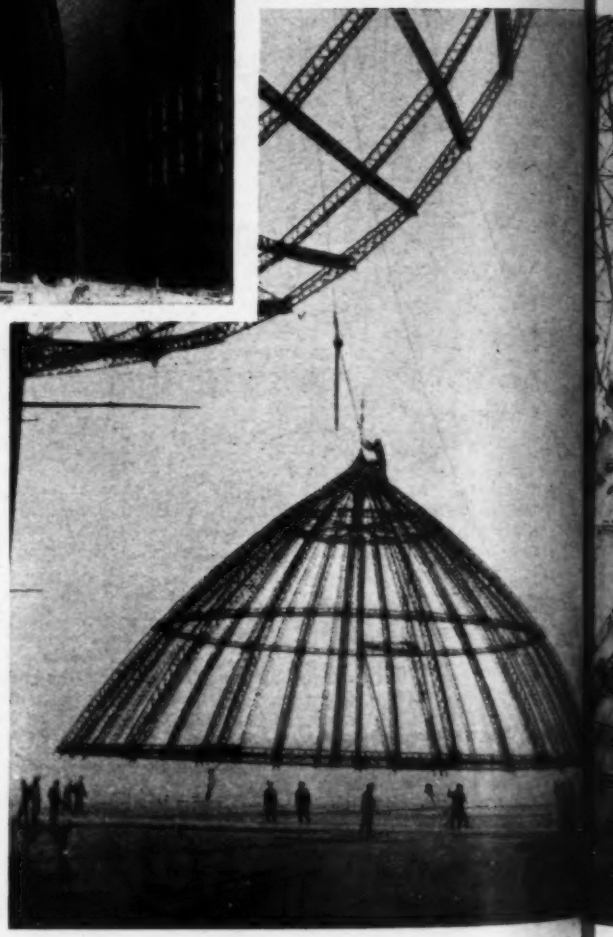
That Dr. Focke, of the German Focke-Wulf company, has solved the control problem, whatever may be one's opinion of the practical utility of his present two-rotor helicopter, was shown in Berlin the other day, when Fräulein Hanna Reitsch made a flight inside the Nazi Deutschlandhalle, which is rather larger than the main hall of Olympia. Those fortunate enough to have seen Fräulein Reitsch fly the helicopter in the open knew that the machine must have been under perfect control. Her take-offs, landing and hovering a few feet up while talking to people on the ground proved that. The Focke-Wulf helicopter had previously collected all the world's records open to an aircraft of this class. But the "record" of being the first to do indoor flying is, perhaps, more significant than any of them.

We in this country can claim to have flown helicopters indoors many years ago. The old balloon shed at Farnborough was the scene of certain helicopter experiments, but few would claim that the machines were under control. Now that the Focke-Wulf has demonstrated that at any rate one solution of the control problem has been found, there remains but to clean the machine up so as to give it a fairly good performance in horizontal flight.

In the meantime, our own rotating-wing experts are not by any means idle, and it is likely that in the near future the world will learn that Great Britain, for many years the centre of this particular type of research and development, is still in the running. The military people are sitting up and taking notice, and that generally means that something will be done.

The last helicopter to be built in this country was the Isacco, which was not a success.

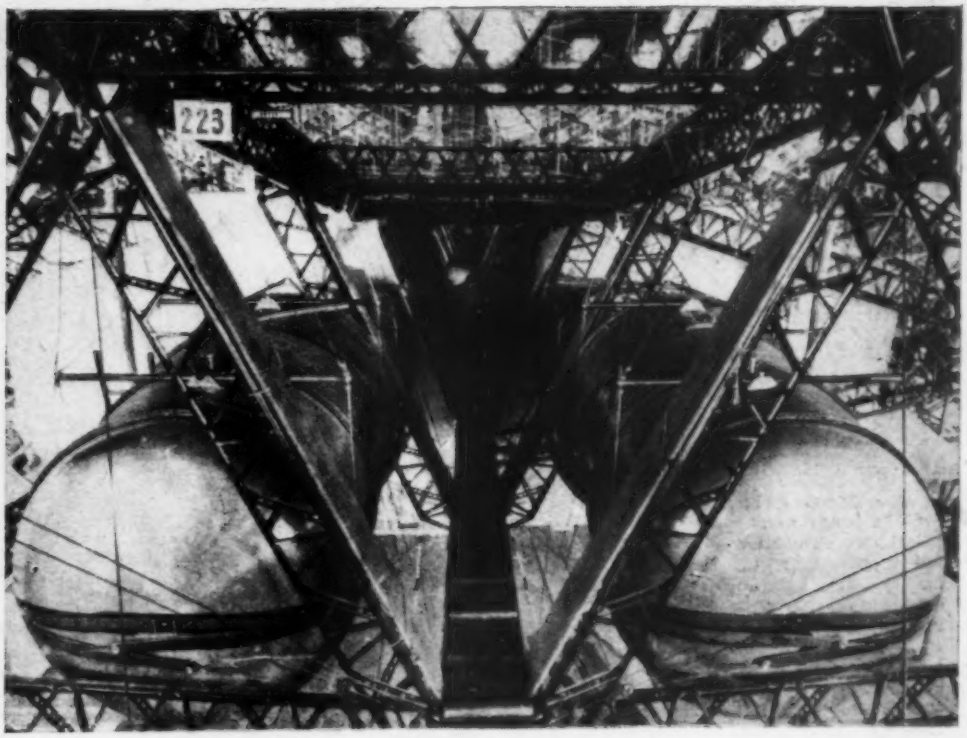




Some Glimpses of

THE NEW ZEPPELIN

AS will be gathered from the above picture, work on the Zeppelin LZ-130 is advancing rapidly, the framework being more or less complete. Sections of the envelope have been left off to permit the insertion of the gas bags, which will contain helium instead of inflammable hydrogen as in the ill-fated LZ-129 or *Hindenburg*. The new ship resembles its forerunner in essentials though the passenger accommodation is smaller. Second and third views in the top row depict the control car and the keel catwalk and the three below show the nosepiece being hoisted into position, some of the huge rings and the application of the dope to the envelope.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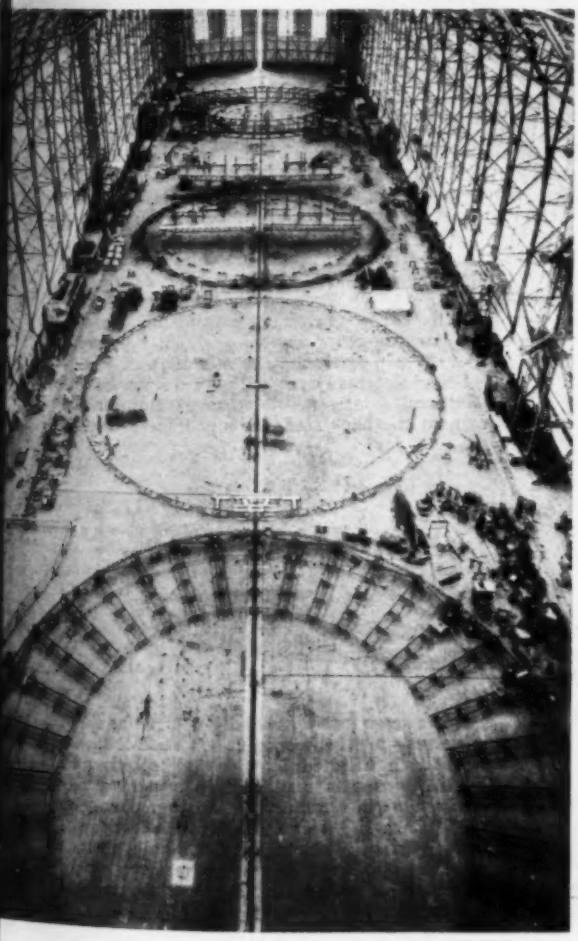
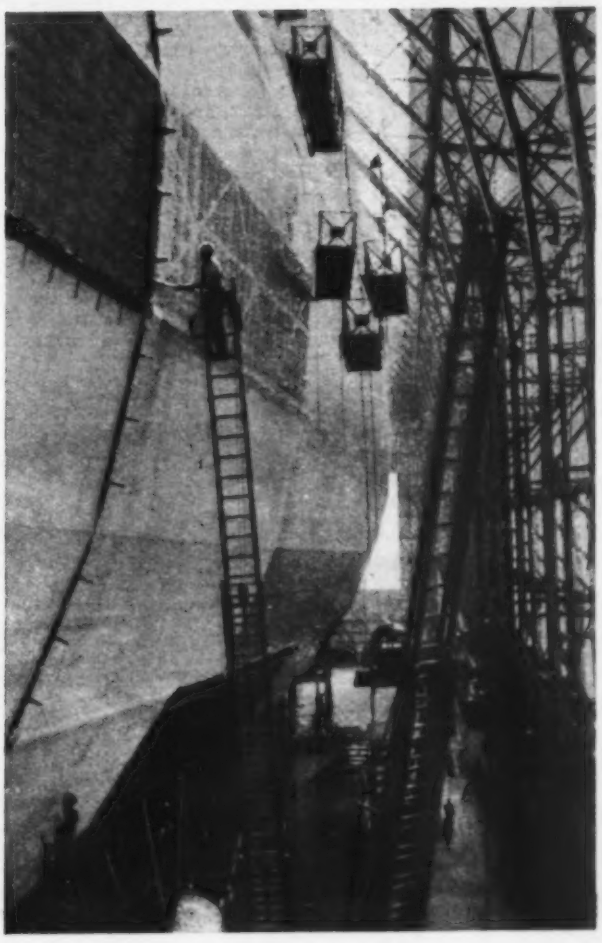




TWO-SEATER FIGHTERS —will they survive?

Thoughts on the Potentialities of the Class

By H. F. KING

The unorthodox French Delanne now under construction. A top speed of 370 m.p.h. is calculated, with an Hispano Suiza Series Y engine. The excrescences are a shell-gun and a radio mast.

VERITABLY a Cinderella among aeroplanes, the two-seater fighter has a unique history. It is generally conceded that the Bristol Fighter, introduced in 1916-17, was a major factor in establishing the eventual Allied superiority in the air, but after the Armistice the type was relegated to general purpose duties, and for very many years the two-seater fighter was unknown to R.A.F. squadrons, though spasmodic attempts were made to revive it. Seven years ago the Hawker Hart was adapted for fighting duties, and under the name of Demon became the standard two-seater fighter of the Royal Air Force.

Demons, but slightly modified, were in production until very recently. As at present standardised the type has two fixed guns and a free Lewis gun in an hydraulically operated Nash and Thompson turret. It was, incidentally, the first Service type to incorporate this latter refinement, though the fullest advantage can hardly be gained at speeds around 185 m.p.h. which is something like the maximum of the Demon with the de-rated Kestrel V engine. Equipment includes two-way wireless, night-flying gear and racks for four or eight 20 lb. bombs.

Up to the moment no Demon replacement has been announced, though, considering the numbers of Demons in service, it is hardly to be expected that the two-seater fighter will disappear from the R.A.F. as suddenly as it made its belated reappearance. But the type will have to be developed to the utmost if it is to survive against the multi-seater, multi-engined arsenals as now being tested abroad. Whether the next standard British two-seater fighter will be a single- or a twin-engined model is still an Air Ministry secret. With engines of 1,500 h.p. and more on test, lack of a suitable power plant for single installation is not likely to be the deciding factor in the adoption of "twins." Rather the issue is likely to centre on the questions of armament mounting and forward vision; and as the forward-firing armament is likely to take the form of shell-guns with a limited arc of movement a third man may be required to operate the rear weapons. So it does seem that the two-seater may be retained as a powerful single-engined type with fixed guns for the pilot and axially restricted armament for the man in the back seat, for any hope of broadside fire seems more assuredly doomed as speed increases—in other words, the question of broadside fire is affected by the high speeds now attained, as was explained in a note a few weeks ago (in our Service Aviation pages) on the "Cazaux effect"; serious deflection of bullets or shells occurs, and the only obvious remedies appear to be the unsatisfactory ones of either increasing the charge or lengthening the barrel.

A Hawker Demon with Nash and Thompson gun turret. The Demon has been the standard R.A.F. two-seater fighter for seven years.

(Right) The Miles Kestrel Trainer which would make a very good first-line two-seater fighter, having a speed of 295 m.p.h.

(Below) Accent on manœuvrability: the Koolhoven F.K. 52 (Bristol Mercury) a two-seater fighter with four guns.

The twin-engined fighter, judging from current indications, is likely to be a three-seater. The pilot will aim the machine at the target to the best of his ability when the front guns are to be used, while the front *gunner* trains his weapons over a limited arc should correction be needed; the rear gunner must do the best he can, for he is likely to have little opportunity when speed is high, or there is a suggestion of manœuvring. It may be, of course, that this third man will eventually be eliminated, and that the crew will consist of the pilot and his gunner working in the closest possible co-operation. For certain duties the larger multi-seater, on the lines of the American Bell Airacuda, may be adopted, though this type, with its lateral, as well as fore-and-aft, armament, is condemned by some who say that it marks a return to the *multiplace de combat* theme, and that the big "battle wagon" is impracticable due to restrictions on lateral fire.

Official restrictions make it impossible to discuss future development of the two-seater fighter in this country with any reference to fact. We can only rejoice in the knowledge that if development is based on the use of the conventional tractor monoplane we have, in such machines as the Fairey P.4/34 and the Hawker Henley, some excellent material on hand. Certainly the adoption of ventral bomb stowage, as in the case of the Henley, does complicate matters if conversion be considered, though wings, engine and mounting, undercarriage and tail might be made interchangeable if required.

The French Delanne

Continental Powers appeared almost to have abandoned the development of single-engined two-seater fighters in favour of the twin-engined three-seater, but information recently received from France relating to the new Delanne (illustrated in the heading of this article) indicates that interest is still very much alive, even in the spiritual home of the multi-engined multi-seater. This Delanne, it will be gathered, is of unorthodox layout, and may be regarded either as a very heavily staggered biplane with no tail, or as a high-wing monoplane with a short fuselage and very large tailplane. Armament, apparently, comprises a shell-gun mounted on the Hispano Suiza Series Y engine, two more guns (probably machine guns) in the wings, and a second shell-gun in the rear where its field of fire is exceptionally good, and rivalled only in the two-seater fighter class by that obtained in the Westland-Hill Pterodactyl V of a few years back. Preliminary particulars give no indication of the undercarriage arrangements or of construction, but the estimated top speed is 370 m.p.h.

The gull wing of the new Delanne recalls that of the French Mureaux two-seater fighter (Hispano 12X, 690 h.p.) which, though reputed to be outstandingly fast and agile for its period, was never put into production.

Incidentally, the French regard the larger Mureaux monoplanes, which they are using in large numbers for reconnaissance, as potential night fighters, on the score of their endurance and low landing speed, coupled with a useful performance.

In Holland, Koolhoven has his F.K.52 Mercury-powered biplane, which is reminiscent of a Gladiator in appearance and of a Gauntlet in performance. So far as is known, no orders have yet been placed. Armament consists of four guns; the pair for the pilot may be shell-guns.

Fokker, in the G.1 (*Le Faucheur*), has a fine example (though unorthodox) of the twin-engined two-seater fighter wherein the four nose guns, two of which are Madsen shell-guns, are fixed. A cone-shaped Plexiglass turret houses the rear gun. It may be significant that a production version for Finland will be a slightly larger three-seater. Possibly the front guns may be made "semi-fixed," though it may be that Finland requires the type not primarily for fighting but rather for general purpose work.

Italian Practice

Italy regards her two-seater fighters as close relatives of the "assault" machine; in fact a typical example, the Breda 65, may be equipped as a single- or two-seater fighter, a light bomber or reconnaissance machine or for ground attack or "assault" work. The adoption by the Regia Aeronautica of the Breda 88, which averaged 321.24 m.p.h. over 621 miles, indicates a partiality for the light twin-engined three-seater fighter-bomber.

The United States adopted the two-seater fighter at about the same time that Great Britain took up the Demon, standardising on a Berliner-Joyce biplane with a Curtiss Conqueror engine and gull-type wings. This was superseded by the Consolidated P-30, a low-wing metal-skinned cantilever monoplane, with a retractable undercarriage and a top speed, according to rumour, of about 250 m.p.h. The engine of the P-30 is likewise a Conqueror, but incorporates an exhaust-driven supercharger, a device which has been applied to the Allison engines on the new Bell Airacuda. No replacement in the two-seater

fighter (or more correctly pursuit) category has been announced, so it may be that the outcome of tests with the Bell are being awaited before an order is placed.

So, at the moment, the destiny of the two-seater fighter is in the balance. It may survive for years yet as a single-engined type or it may be developed with two engines, in which case it will be in competition with the three-seater, with front and rear guns, and with still larger types, after the style of the Bell.

The rear armament, which has always been regarded as such an essential item of the two-seater's stock-in-trade, should be particularly effective in breaking up formations of fast bombers which, like the Blenheim and Dornier Do. 17, have no free gun in the nose, depending on cross fire from the rear turrets or on breaking formation and using the forward fixed gun, if attacked from in front and below.

The old argument that the rear gun is useful for covering retreat after an attack still holds good, though the employment of all free guns has been heavily restricted.

For Fleet work a two-seater fighter may be employed alternatively as a dive bomber, as, for example, the Blackburn Skua. Furthermore, the rear gunner might come in very useful after a low-flying attack.

If, in face of influence from abroad, a crew of two is retained, designers will have some nice problems relating to view, disposition of armament and field of fire. In all probability there will be room, for some years to come, for the single, two- and three-seater fighter, though the practicability of larger crews is decidedly problematical.

AMONG the NEW BOOKS

Astronomical Navigation : World Travel

"Astronomical Navigation Made Easy," by G. W. Ferguson, M.C., A.F.C.; 5s., Sir Isaac Pitman and Sons, Ltd.

THE author, Capt. Ferguson, has had much practical experience of piloting and of instructing young pilots in the air and on the ground, as countless grateful pupils will testify. He has now interested himself in astronomical navigation and approaches the subject by putting himself in the position of a pupil who does not know how to commence the study of the problem, and who finds himself surrounded by a mass of existing text books dealing with an apparent mystery.

A number of text books have been examined and have provided the author with the essential material and formulæ, which are then clearly set out and expounded—in some cases with ingenious variations from the orthodox—in an "easy reference" manner.

It is, perhaps, unfortunate that the book was compiled just before the Air Ministry *Air Almanac* was published in October, 1937. The Greenwich Hour Angle method adopted therein of rapidly finding the Hour Angle of celestial bodies (which is the chief difficulty in navigational calculations), has rendered obsolete, so far as air navigation is concerned, the well-known and well-tried, but more lengthy and laborious methods based on the data tabulated in the *Abridged Nautical Almanac*, which are quoted in the book under review.

We feel, therefore, that we must completely disagree with the statement in Appendix II, apparently inserted after the appearance of the *Air Almanac*, that the latter "does not provide, at sight, certain quantities necessary for astronomical computations." Disagreement may also be expressed with the methods expounded of obtaining *longitude* by means of ex-meridian sights, particularly in the section on p. 55 headed "I am somewhere in the Atlantic. Where am I?" In this latter example both latitude *and longitude* are held to be obtainable by means of a single ex-meridian observation of the sun; the determination of position by means of one sight has been the dream of all navigators since celestial observations were first made, but so far has proved very difficult to achieve in practice.

The fly in the ointment in this particular example is that reliance is placed on a compass bearing of the sun taken when that body is near the meridian. Practical experience shows that a bearing taken under these conditions is normally unreliable owing to the rapid change in azimuth, and, usually, is mechanically impossible to obtain with the bearing compasses in common use. In addition, in order to obtain the True Bearing, it is necessary to know accurately the Deviation and the Variation—for the latter, good dead reckoning is essential.

In the particular case stated, late in October, with an altitude of 26 deg. it would no doubt be possible to obtain a fairly satisfactory compass reading—but it would not be possible in the latitude quoted (50 deg. N.) at other seasons of the year, as the altitude increases. The limitations of the method should have been made clear to the tyro, who is otherwise liable to be misled into thinking that it can be generally used. D/R is the basis of navigation, and single celestial observations taken in aircraft serve primarily to check the accuracy of the D/R, either for latitude or for longitude, depending on the true bearing of the body and the track being followed. In the example quoted the navigator must have largely disregarded this important principle, as the "position" obtained from the single sight is admitted to have a possible error of 1 deg. of latitude and 3 deg. 36′ of longitude, primarily owing to a possible Variation error of 4 deg. due to bad D/R. The check of D/R thereby provided is not very reassuring.

In conclusion, while the author's industry and exposition of mathematics is admired, it is considered that the value of the Astronomical Navigation portion of the book will be greatly increased for air navigation purposes when the Greenwich Hour Angle system of finding the Hour Angle has been expounded in a future revised edition, and an explanation of quick-working methods included.

"A Passport Round the World," by Charles H. Holmes, author of "We find Australia"; 12s. 6d., Hutchinson and Co. Ltd.

MANY people have flown from Australia to England by Qantas Empire Airways and Imperial Airways, and have written about the experience. Plenty of people have also travelled on to the United States, written about what they have seen, and completed the circuit of the world by steaming across the Pacific to Australia. Mr. Holmes just adds one more to the list of those who have described such interesting travels. Probably there are an infinite number of observations which might be made about the various countries traversed, and, therefore, there is always room for another book.

Mr. Holmes describes things very well. One fancies that he sometimes consulted guide books, and he has made some slight mistakes in the history of Moghul India which he has jotted down; but his book makes attractive reading, and can be recommended.

Forthcoming Events

February 21-March 4. British Industries Fair.

February 25. Hampshire Aeroplane Club. Annual Dinner and Dance, South-Western Hotel, Southampton.

February 25. Liverpool and District Aero Club: Annual Ball, Grosvenor Hotel, Chester.

March 3. R.Ae.S. Lecture*: "Riveting Methods in Germany," by Dr.-Ing. W. Pleines.

March 4. Cambridge University Air Squadron: Annual Dinner, University Arms Hotel, Cambridge.

March 10. R.Ae.S. Portsmouth Branch Lecture: "Air Raid Precautions," by Sgt. Barnes.

March 11. Cinque Ports Flying Club: Annual Dinner and Dance, Grand Hotel, Folkestone.

March 23. R.Ae.C.: Annual General Meeting, 6.30 p.m., 119, Piccadilly, London, W.1.

March 24. R.Ae.S. Portsmouth Branch Lecture: "Refuelling in the Air," by Sir Alan Cobham.

March 25. Portsmouth Aero Club: Annual Ball Pavilion Ballroom Southsea.

April 1. Bristol and Wessex Aeroplane Club, Ltd.—Annual Dance, Victoria Rooms, Clifton.

April 7. R.Ae.S. Lecture*: "The Manipulation of the Boundary Layer," by Mr. E. G. Richardson.

April 21. R.Ae.S. Lecture*: "High-altitude Flying," by Prof. J. E. Younger.

April 28. R.Ae.S. Lecture*: "Factors Controlling the Development of Electrical Ignition on Aero Engines" by Dr. G. E. Bairsto.

May 14-22. Finnish Aero Show, Helsinki.

* All these lectures take place at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1., beginning at 6.30 p.m.

PRIVATE FLYING

FOR DUAL, NOT DUELS: "Student" is the type-name of this new monoplane from the German Bäcker works, which have achieved unusual success in a comparatively short time with their biplane trainers. Intended for private-owner and primary school use, it is said to cruise at 100 m.p.h. on the 55 h.p. of the Czecho-Slovakian Walter Mikron four-in-line. A range of 400 miles and fuel consumption of 2.4 galls./hr. are claimed.

Topics of the Day

Planned Descent . . . .

ON occasion I have said a good word about the idea of a multiplicity of instruments for use even in machines which are not, save by accident, likely to be flying in the sort of weather when a very comprehensive array is really necessary. Usually my reasons have been that any new or strange instrument adds to the interest of flying as such, and that the really accurate navigation which is rendered possible with their help can reduce what is sometimes the tedium of long cross-country flights over dull country.

Not long ago I mentioned the rate-of-descent indicator as an instrument with a somewhat new value now that machines are tending towards the sink-approach ideal. However safe and controllable a machine may be at the stall, and however extensive may be the degree of undercarriage movement, there is obviously a limit to the vertical velocity which is safe, and allowance must always be made for a down-draught or a sudden reduction in wind speed during the last few seconds. In the case of any machine a rate-of-descent indicator might be a useful guide in such circumstances and could be considered as almost indispensable where the tricycle technique is concerned.

Although one or two enthusiastic demonstrators have glided their experimentally tricycled machines straight into the ground at quite alarming speeds and angles—with me as the supposedly imperturbable ballast—it is obviously not for such purposes that the three-wheeled undercarriage has suddenly been taken out, dusted, and exhibited as a new and praiseworthy idea. The principle is designed to make normal landings more easy rather than to make dangerous landings safe. Nevertheless, when there is no need to organise a particularly accurate hold-off there is a chance that a machine might be accidentally flown like a pile-driver into the earth, with dire results to the front wheel, and a rate-of-descent meter would at any rate help to reduce this possibility.

Sometimes, too, gust conditions can play havoc with vertical accelerations near the ground, and such an instrument might at least be a great help. Unfortunately, this device is at present much too expensive to form part of the standard equipment of a light aeroplane, though in due time, when the exigencies of the expansion scheme are no longer quite so obvious, examples actually made in this country may be available for humble civilians at reasonable prices.

. . . . And Ascent

THE same applies to the sensitive altimeter, though here the value for our purposes is rather less obvious except in the case of the very machines in which it will never be seen—low-powered ultra-lightweights in which every foot of height must be fought for and in which the best possible rate of climb must be discovered immediately after leaving the ground if certain large obstacles on the aerodrome boundary are to be cleared with an adequate margin.

Some of these machines are so sensitive in this matter that a variation of five miles an hour in the air speed makes all the difference between a good rate of climb and soggy flight without any gain of height whatever. A very sensitive vertical-velocity meter on the lines of those which are seen in the cockpits of sailplanes might be a useful fitting in such cases, and I know that if, for my sins, I was forced to act as test pilot in a low-powered aeroplane which had not previously been flown, I would certainly demand that such an instrument should be fitted before I left the ground.

Another instrument which would also be useful, particularly in the case of low-powered machines, would be a cylinder-head temperature gauge, which would give some indication of the state of an engine which is being driven at full throttle in the steepest possible climbing attitude. Perhaps it is just as well that such instruments are not fitted to small aeroplanes, since an otherwise uneventful cross-country flight might be made into a terrible experience with the cylinder heads showing a temperature quite 100 deg. C. higher than they should be, while the engine, nevertheless, revolves with perfect smoothness and gives full revolutions.

Directional

SO far as what are known as free gyro instruments are concerned it seems that these will always remain outside any inexpensive light aeroplane except such as are equipped regardless of expense by some enthusiastic owners. Unfortunately, the correct and reliable functioning of these instruments depends almost entirely on superb accuracy in gyro-bearing manufacture and assembly; furthermore, they are likely always to require rather more careful maintenance than any normal instrument or any blind-flying instruments of the restrained type.

Nevertheless, anyone who has flown for a reasonable length of time on a directional gyro will appreciate its virtues even though these virtues are, so to speak, second-hand. In other words, the plain magnetic compass still remains the focus of all navigation, and the gyroscopic direction indicator must be set with its aid before it can be used.

We are so used to the business of dealing with the inevit-

PRIVATE FLYING (CONTINUED)

able though temporary errors in the magnetic compass that we hardly appreciate its defalcations until a directional gyro is used during a long cross-country flight in bumpy weather and bad visibility. Any budding transport pilot who has gone through a course of blind flying under the hood with the help of a turn indicator and a compass must positively lean back in comfort when he flies blind for the first time in a big machine fitted with free gyro panel.

Turns can be made straight off the reel without allowance for lag and without the need for holding off bank. What you see on the free gyro instrument dials is exactly what is going on in the outside world. No translations are necessary. Perhaps one day a means will be found of producing the results without the need for such accurate workmanship, and we shall then have blind-flying instruments which do not imply preliminary pilot-training.

Not that I suggest that the amateur pilot will be free to do any serious blind flying for many years to come. A few transport operators appear to have received something of a shock when they read the *Notice to Airmen* describing the new directional system of control (p. 91, *Flight*, January 27), which ostensibly permits you, me, and anybody else, to fly in any sort of weather so long as we stick to certain defined height levels according to the particular magnetic course on which we are travelling. Somehow I do not think that *N. to A.*, No. 8 of 1938, will make any difference to my own nervous reactions on the subject of blind flying with one engine and without two-way radio equipment; nor to yours. INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON

FLYING for the week ended February 11 showed 61 hr. 45 min., and a first solo flight was made by Mr. F. R. Parker. Mr. H. Layton is a new member.

HAMPSHIRE

Unhelpful weather was responsible for the comparatively low flying hours, which totalled 22 hr. 40 min.

STRATHTAY

For four days during the week ended February 6 there was no flying, owing to high winds, but for the rest of the week a total of 9½ hours was recorded.

NORTHAMPTON

For the time of the year the flying is well up to average, and new members include Messrs. P. A. Wright, J. C. Richardson, B. W. Miller, and Mrs. D. M. Goodman.

C.A.S.C.

In spite of a large attendance of members, high winds and hailstorms prevented more than 3 hr. 40 min. being flown. Mr. W. Lee took his initial flight with the Corps.

YORKSHIRE

Flying for the month ended February 11 made 30 hr. 15 min., and 24 hours of this was flown during last week. A dance will be held in the clubhouse on February 19.

CINQUE PORTS

Fog, low cloud, gales and snowstorms interfered with flying last week, and only on Wednesday was it possible to make any compensation, 7 hours being put in. Messrs. K. J. Robertson and K. Lingford made a trip to York in the Puss Moth to collect the latter's Avian.

HANWORTH

A landing competition will be held at Aldenham Aerodrome on Sunday, February 20, and early application for entrance should be made. A "dawn" patrol on March 6, at Hanworth Aerodrome, is timed for 8.15-9 a.m. The total flying for the week ended February 12 came to 33 hours.

BORDER

Arrangements are well in hand for the "Border raid," which, as related last week, is to be held on Sunday, March 6. Despite the generally unfavourable weather conditions a total of 22 hr. 30 min. was flown for the week ended February 11. Cross-country flights were made to Hatfield, Montrose, Edinburgh, and Newcastle.

BARTON (BEDS)

The first meal was served in the newly furnished and decorated clubhouse of the Bedford Flying Club last Sunday at teatime, and was enjoyed by fifty-five people, who had turned up in spite of a continuous heavy snowstorm. Four enthusiasts in aeroplanes braved the elements to attend, one coming from as far afield as High Post.

PORTSMOUTH

The spell of fine weather enabled the Portsmouth Aero Club to make further progress with the £25 "A" licence scheme. Solo flights were made by Messrs. R. T. Johnston, J. James, and Lt. Cdr. W. L. M Brown. Thirty hours' flying was logged up to February 6, 22 hours of which was dual instruction. New members were Messrs. P. G. S. Dickenson, Didar Singh, G. B. S. Coleman, F. C. Mabbett and G. A. V. Clayton, Sir Norman H. Pringle and Lt. F. H. E. Hopkins, R.N.

BROOKLANDS

The second monthly handicap competition—a forced-landing one—was held last Sunday in spite of a 25 m.p.h. ground wind. This demanded a "three-pointer" in the middle of a circle, and the best two out of three landings were taken into account. Mr. Clifford Mollison, of "Balalaika" fame, proved to be the winner with 81 marks, followed up by Mr. Spooner with 73 and Mr. Nepean Bishop third with a score of 68. A further attraction was a demonstration of the C.W.A. Cygnet, which was flown by a dozen or so members. In the evening a tea dance was held, and a presentation of a typewriter and a cheque was made to Capt. R. Y. Bush, who for so many years was the club secretary under extremely difficult conditions.

MARSHALL'S

The rough winds were turned to advantage by the advanced pupils, who gained some good experience in rough-weather flying. Blind flying was also put into practice, and the whole total for the week made 40 hr. 14 min. Cross-country flights were undertaken to Warwick and Abingdon, and Mr. Lowe carried out his first solo. The R.A.F.V.R. (Cambridge Centre) commenced operations on February 1.

REDHILL

Bad weather was accepted with a good grace, and indoor activities took the place of flying. A successful dance was held at the Burford Bridge Hotel, Dorking, on February 4, and was attended by over a hundred members and their guests. The squash court also came into its own and caused much strenuous exercise. Mr. Carswell made a trip from Edinburgh to Redhill in the Puss Moth.

BRISTOL AND WESSEX

The Bristol interpretation of a scholarship scheme has been put into action and 225 candidates were tested. Out of twelve finalists, the three winners will be trained for an "A" pilot's licence free of all cost. The club annual aviation dance will be held at the Victoria Rooms, Clifton, on Friday, April 1. Flying for January amounted to 47 hr. 15 min., and for the week ended February 11 16 hr. 40 min.

BOMBAY

An instructional cross-country flight to Colombo and back, three machines participating, was made by three members, with three of the staff as instructors. Other cross-countries were made to Poona, Nagpur, Lucknow, and Allahabad, and the total flying for the month of January reached 274 hr. 20 min., including 8 hr. 45 min. night flying. Messrs. P. M. D. Thackeray and P. A. Mehta have completed their "A" licence tests, and Mr. J. G. Pathare has obtained his. Mr. V. N. Modak made his first solo flight.

HERTS AND ESSEX

With the intention of visiting the French aero clubs, Mr. and Mrs. A. R. Frogley, together with Messrs. G. L. Parbury and D. Wright, left on Wednesday for Paris. Their visit will take ten days. Mr. E. Krog made his first solo and completed "A" licence tests, while Mr. L. Manilal accomplished his "B" licence night flight. An instructor's endorsement was added to Mr. D. A. Cather's "B" licence. Flying was possible on only 11 days of the fortnight ended February 10, when 108½ hours were logged. The total for January's flying was 217 hr. 58 min.

NORFOLK

A challenge for a "dawn" patrol, emanating from the London Air Park Flying Club, has been accepted for March 6, between 8.15 and 9 a.m. Activities during last week included a demonstration of the new Wicko monoplane by Mr. E. H. Wikner, and, although flying was handicapped by the high winds, Mr. H. F. Low was kept busy Press-photographing the flooded Horsey district from the air. Gliding at the Club is rapidly increasing in popularity, and last week-end Mr. A. E. Firman was able to reach an altitude of over a thousand feet. Mr. Hugh Bergel is to give a lecture on gliding next Saturday, February 19, at 8 p.m.

JOHANNESBURG

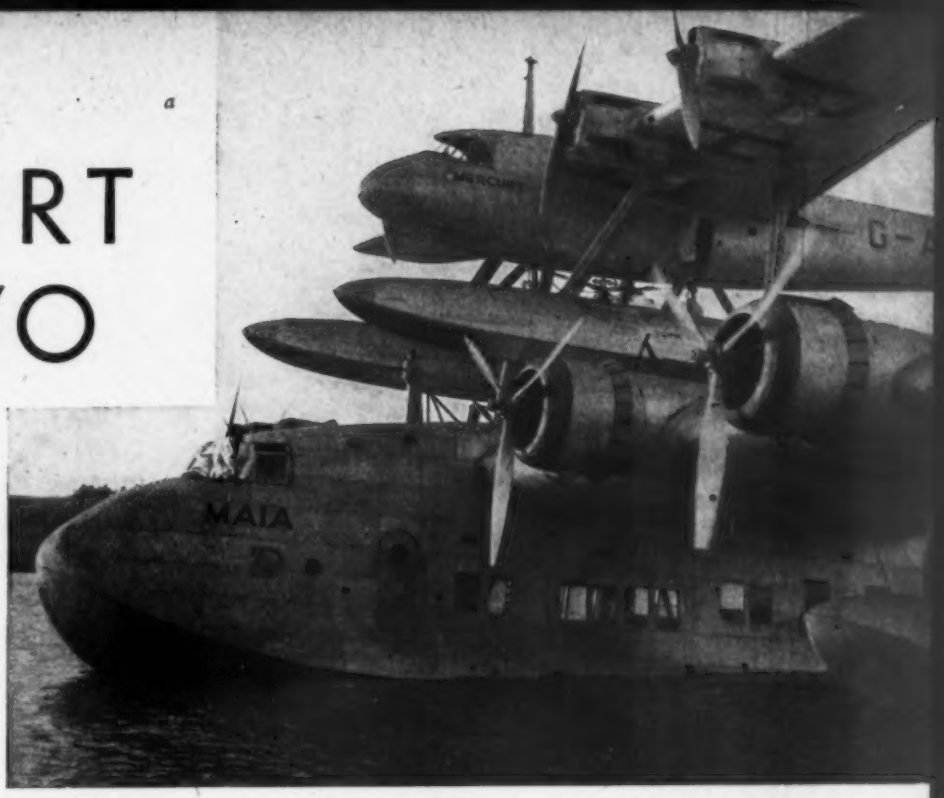
Recent activities of the Johannesburg Light Plane Club included a pylon race, won by Mr. W. L. Grafton, Messrs. G. Morton and L. Simmons being second and third respectively; a rumble landing competition, which was won by Mr. Pessen, with Mr. Simmons second and Mr. Job third; and participation in a breakfast cruise to Parys organised by the Rand Flying Club. Social functions included the Canary Club Ball, held at the clubhouse on December 15, when nearly three hundred guests were present. The grounds were decorated with streamers of coloured lights and the swimming bath was floodlit, and dancing continued until 3 a.m.

Under the Government Training Scheme seven new pupil pilots were allotted to the school on January 1, 1938, which brings the total undergoing training at Baragwanath to 45. A series of lectures is held every day, covering the subjects of navigation, airmanship, and meteorology. Flying hours during December, 1937, were 601. First solos were performed by Messrs. Cooper and Newborn.

SHORT MAYO

The Composite Aircraft Described in Detail

(Illustrated Mainly with Special "Flight" Photographs and Sketches)

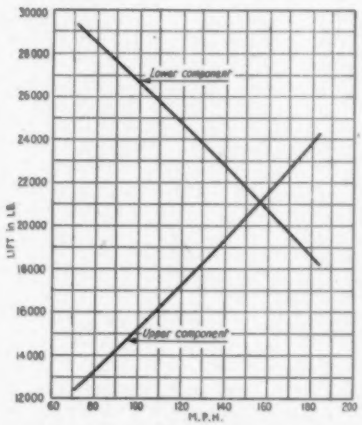


THE successful separation flight of the Short-Mayo composite aircraft, recorded in *Flight* last week, has once more focused attention on one of the most interesting technical experiments made for many years, and has made it possible to publish a detailed description of the aircraft built by Short Brothers, of Rochester, to test out Major R. H. Mayo's theories.

As there is still a good deal of misconception of the fundamental principles involved, it may be useful to examine them again briefly. Readers who wish to study the subject more thoroughly are advised to refer to their copies of *Flight* of November 7 and 14, 1935, in which the Editor explained in simple language the objects and methods of the system.

First of all, it should be pointed out that the *raison d'être* of the composite is to extend the range of an aircraft by assisting it into the air with a greater load than that which it could lift into the air under its own power. Once an aircraft is flying, it needs less power to support itself in flight than that required to take off.

In the Mayo scheme a large but lightly loaded flying boat is used for carrying on its back a much smaller but very heavily loaded floatplane and helping it into the air. When the desired height has been reached the two aircraft separate, the smaller proceeding on its journey and the larger returning to its base.



This graph illustrates how the lift is shared between the two components at different speeds.

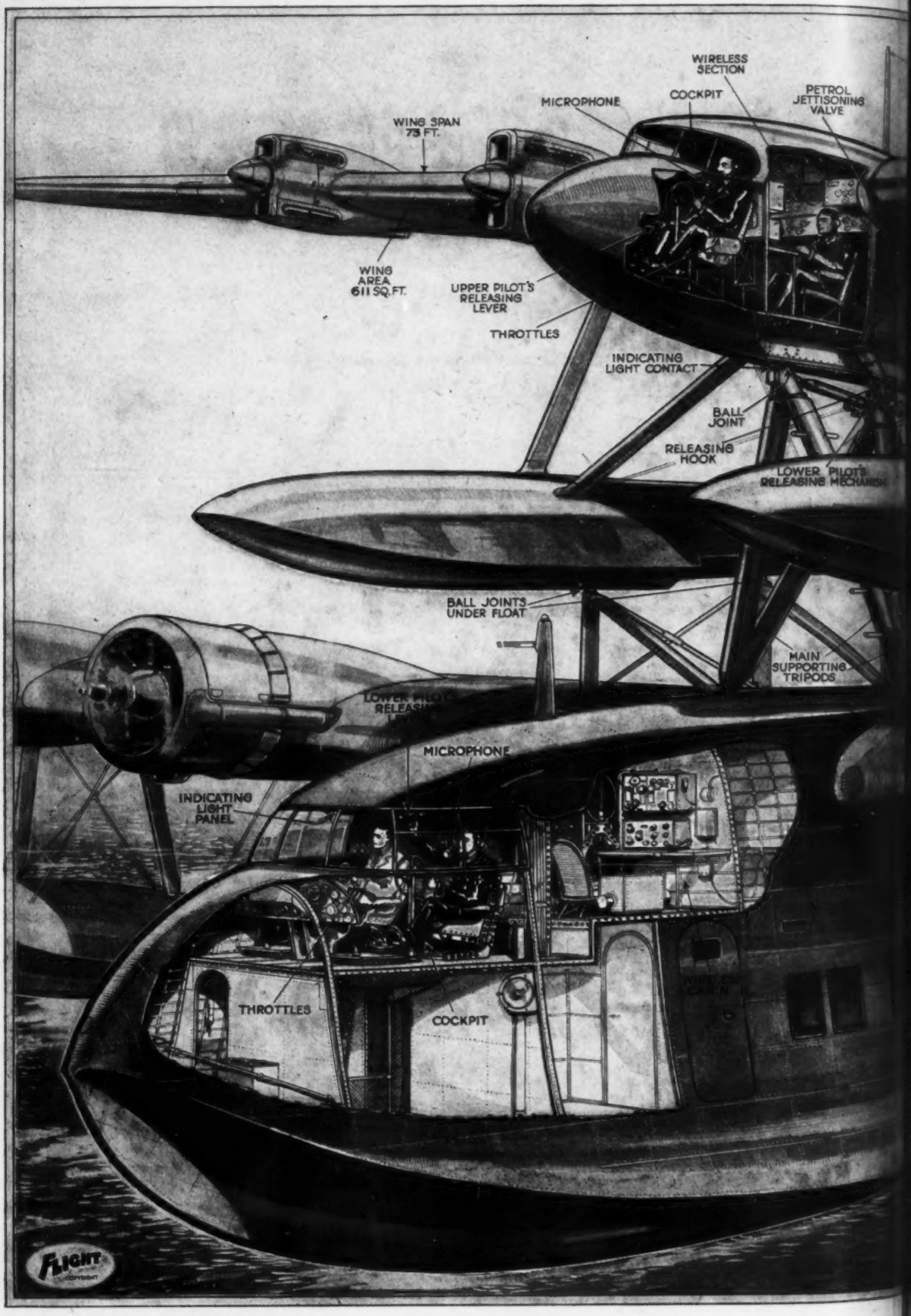
(Below) Some of the people responsible for the composite. Left to right: Major Jack Stewart and Major R. H. Mayo, Mr. Arthur Gouge, and Messrs. Jackson and Lipscomb.

One of the mistakes most commonly made is to think that at the moment of separation the lower component, relieved of the weight of the upper, will tend to rise suddenly, while the upper component, suddenly compelled to carry the whole of its own weight, will tend to drop. If that were the case, the operation would indeed be a dangerous one. Actually, the very opposite is the case; the lower component tends to drop and the upper tends to rise, thus automatically providing the force needed to separate the two. It is, perhaps, the realisation of this fact for which Major Mayo deserves the greatest credit. How it is achieved needs a little explanation, starting with basic principles.

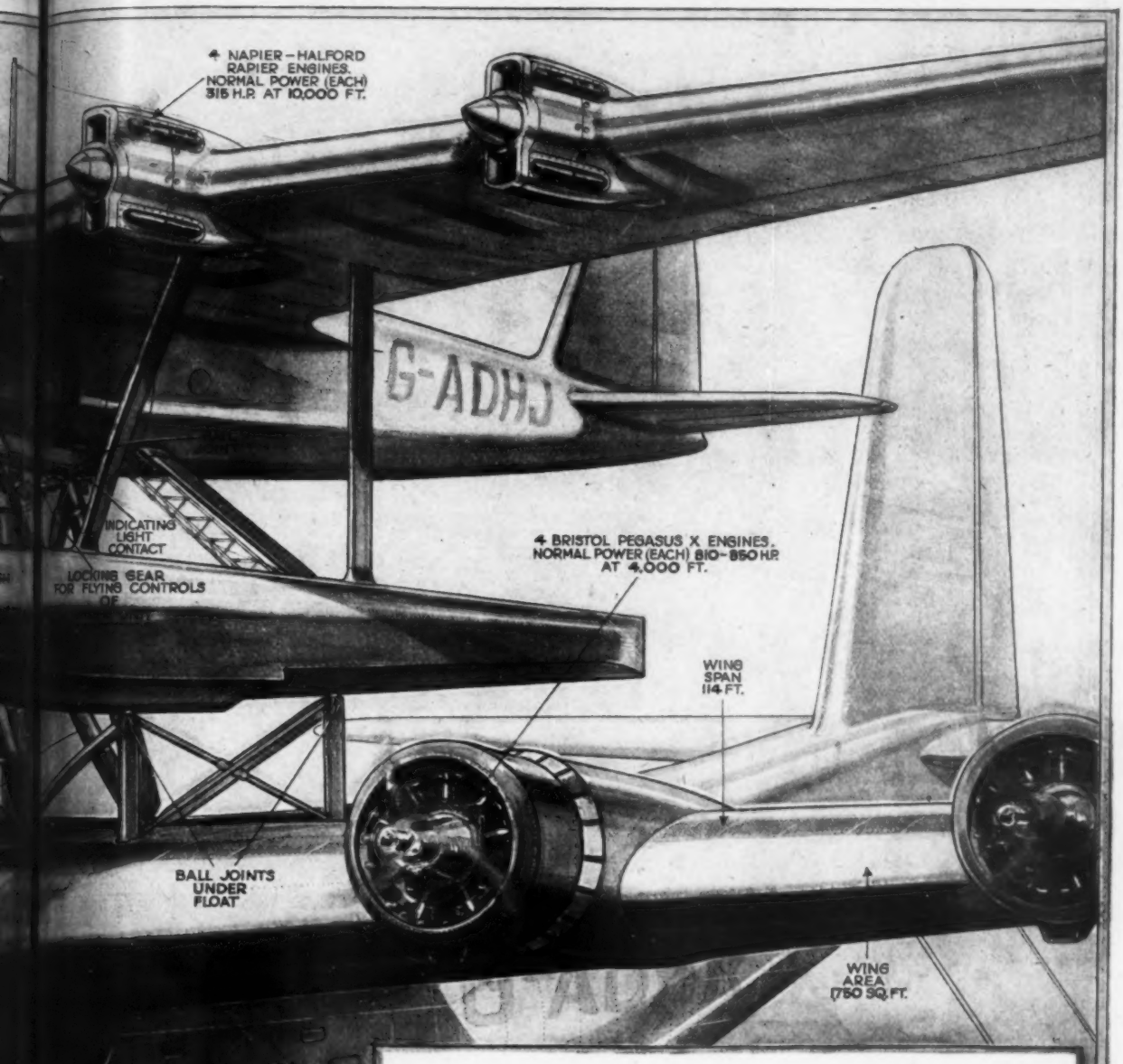
Many of *Flight's* readers will be aware that the lift of an aeroplane wing is represented by a curve of lift coefficients plotted against angles of incidence. From the small angle of no lift to the angle of maximum lift the curve is almost a straight line. At the angle of maximum lift the curve turns into a horizontal direction, and then begins to drop again, showing that maximum lift has been exceeded and the wing has begun to stall.

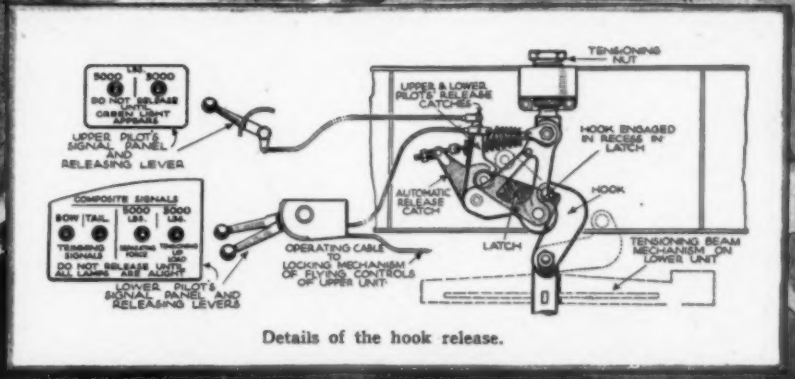
This general shape of lift curve is common to all wing sections, but the values of the lift at the different angles of incidence vary with the type of section used. The secret of the Mayo scheme lies in choosing the two wing sections in such a way that the lift

HOW it is DONE: THE INTE ORS



...ORS of the SHORT-MAYO UNITS


4 NAPIER-HALFORD RAPIER ENGINES. NORMAL POWER (EACH) 315 H.P. AT 10,000 FT.
G-ADHJ
INDICATING LIGHT CONTACT
LOCKING GEAR FOR FLYING CONTROLS OF
4 BRISTOL PEGASUS X ENGINES. NORMAL POWER (EACH) 810-850 H.P. AT 4,000 FT.
WING SPAN 114 FT.
BALL JOINTS UNDER FLOAT
WING AREA 1,760 SQ. FT.

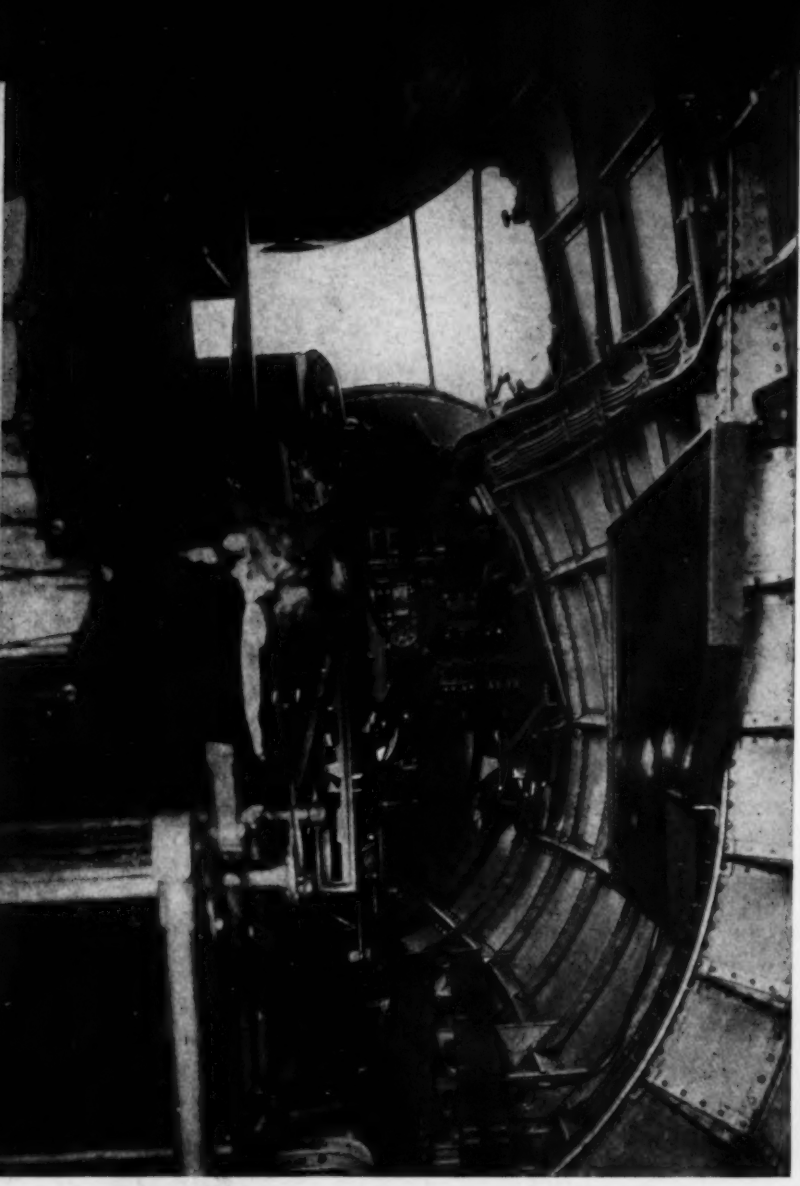

TENSIONING NUT
UPPER & LOWER PILOTS' RELEASE CATCHES
HOOK ENGAGED IN RECESS IN LATCH
HOOK
AUTOMATIC RELEASE CATCH
LATCH
TENSIONING BEAM MECHANISM ON LOWER UNIT
OPERATING CABLE TO LOCKING MECHANISM OF FLYING CONTROLS OF UPPER UNIT
UPPER PILOT'S SIGNAL PANEL AND RELEASING LEVER
LOWER PILOT'S SIGNAL PANEL AND RELEASING LEVERS
COMPOSITE SIGNALS
BOW
TAIL
5000 LBS.
3000 LBS.
TENSIONING SIGNALS
SIGNALLING TENSION FORCE
DO NOT RELEASE UNITS ALL LAMPS ARE ALIGHT
DO NOT RELEASE UNITS GREEN LIGHT APPEARS

Details of the hook release.

Internal arrangement of the composite aircraft. The upper component, *Mercury*, rests on supports on the lower component, *Maia*, on a strong central keel in its fuselage, and is steadied laterally by smaller supports under its floats. Switches are incorporated at the upper ends of the central trestle and show the trim of the aircraft. The release-hook mechanism is placed centrally and includes three separate hooks, as shown in the inset. First the lower pilot releases his hook, then the upper pilot releases his, and finally the spring-loaded automatic hook disengages when the excess pull of the upper component has reached a certain predetermined value.

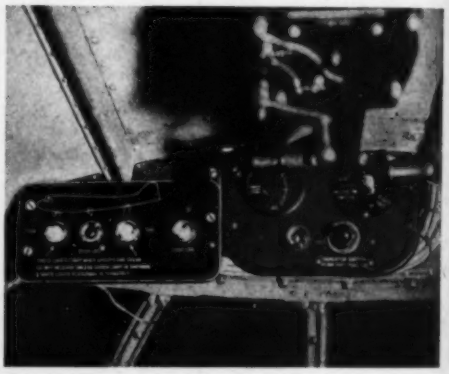
curve of the upper wing is an "envelope" curve, *i.e.*, that at all angles of incidence it is outside the curve of the lower wing. If that is done, the lower wing, or rather the wing of the lower component, will stall before that of the upper component.

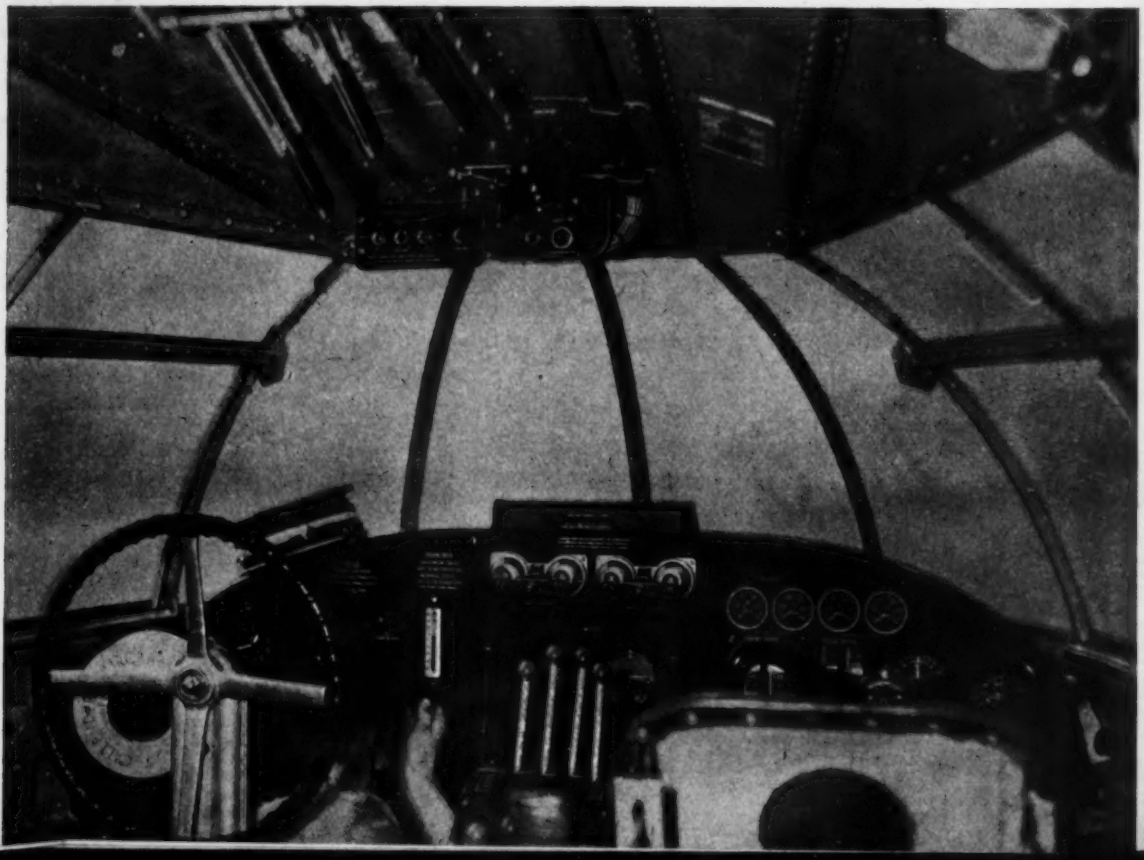
From the lift curves of the two wings it is possible to plot a graph in which the lift of each wing is shown against speed. Here it should be explained that at small angles of incidence the lift is smaller, and it is necessary to fly at higher speed in order to get the lift. The curves on the preceding page bear no direct relationship to the actual Short-Mayo composite, as the two wing sections used as a basis for the calculations are quite different from those of the *Maia* and *Mercury*. One result is that they show a rather lower "separation speed" than that of the actual machines.

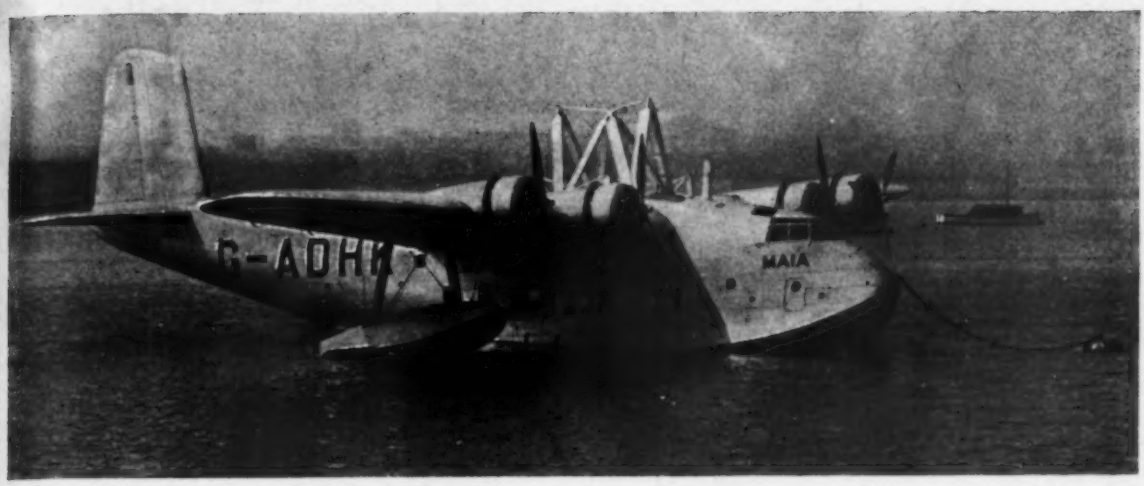


On the left is a view inside *Mercury*, looking forward. The other two pictures show the cockpit of the *Maia*, and the indicating lights which show the trim and pull of the upper component at any given moment.

(Photos. by Callender's Cable Co.)





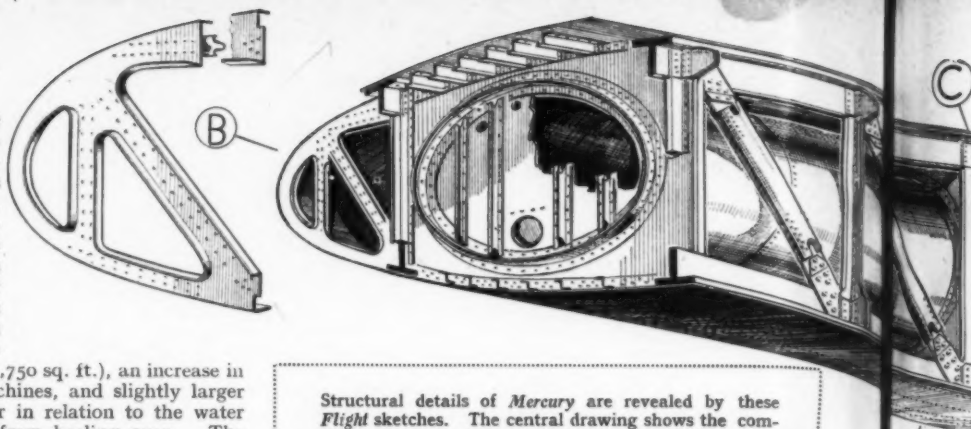


Maia and *Mercury* as separate seaplanes and, at foot of page, as a composite, or eight-engined, biplane.

The principle is, however, exactly the same.

It will be seen from the curves that at low speeds, *i.e.*, just after the take-off, the lower component carries far more of the weight than the upper. As speed increases, the upper component carries more and more and the lower less and less of the weight. At a speed of about 156 m.p.h. in the example chosen (which, as already explained, does not correspond exactly with the figures of the actual machines) the two curves cross over one another. At that speed, therefore, the total lift is equally divided between the two machines. If both are of the same weight that speed will therefore be the one at which each carries its own weight. At any higher speed there will obviously be a separating force tending to pull the two machines apart. The weights of the two actual machines are not equal. The lower component weighs about 27,500 lb., and the upper weighed, at the time of the first separation flight, about 14,500 lb. From the curves this would mean that at about 90 m.p.h. each machine was carrying its own weight, and that at any higher speed there would be a separating force; but again it should be emphasised that the curves were based upon assumed and not upon actual data, and that therefore the example should be accepted merely as showing the principle involved.

Turning from the general to the specific case, the Short-Mayo composite aircraft comprises (a) a large four-engined flying boat, generally similar to, but with a slightly larger



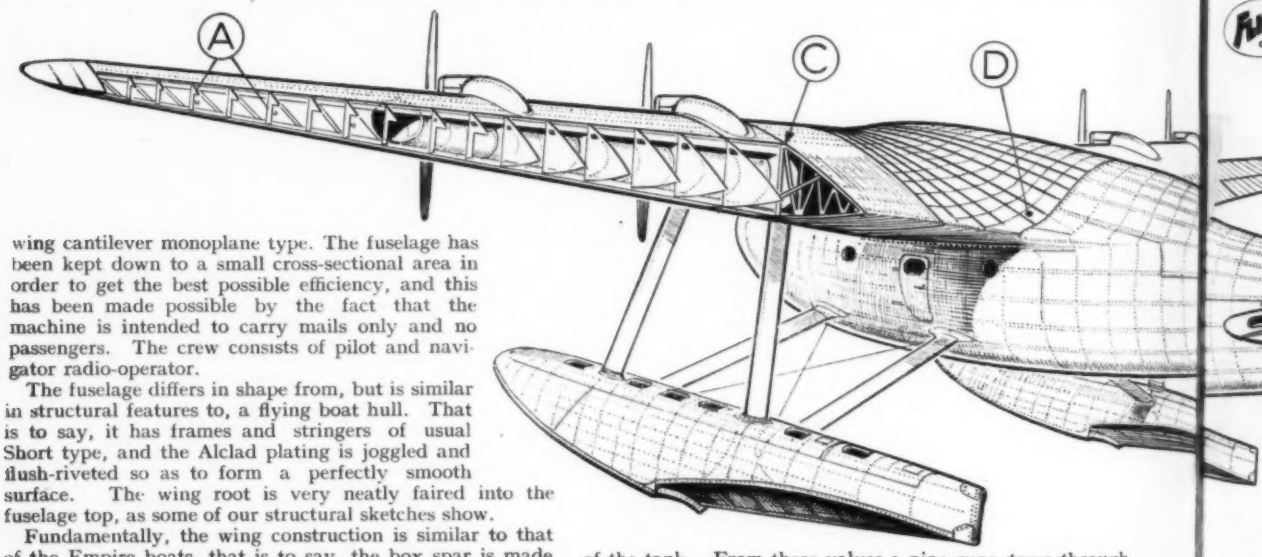
Structural details of *Mercury* are revealed by these *Flight* sketches. The central drawing shows the complete machine, with covering partly removed, and the lettered arrows give a clue to the locations of the structural features which are shown in greater detail in the other sketches.

Spar and rib construction is shown in A as well as in the large drawing at the top of the page. Extruded sections form the corners of the spar box, and the leading edge is built up as shown in B. Details of the tubular bracing of the spar box are illustrated in C, and the construction of the region where the wing joins the fuselage is revealed in D.

The large sketch also shows main constructional features of the fuselage of *Mercury*. It is built rather like a boat hull, and has a stout central keel, on which the weight of the machine is taken when it rests on the trestle on top of *Maia's* wing.

wing area than, the Empire boats, and (b) an upper component in the form of a four-engined twin-float seaplane. As *Maia*, the lower component, shows exactly the same structural features as the Empire boats, a description of which was published in *Flight* of October 29, 1936, it will suffice if it is pointed out here that the main changes are an increase in the wing area (from 1,500 sq. ft. to 1,750 sq. ft.), an increase in the beam of the hull over the chines, and slightly larger outboard floats, set rather lower in relation to the water line so as to prevent the craft from heeling over. The ailerons are also larger in order to give sufficient control for the composite during the time when the controls of the upper component are locked. The engines of the *Maia* are, as in the Empire flying boats, four Bristol Pegasus Xc, which give a maximum output of 875-915 b.h.p. at 2,600 r.p.m. at 6,250ft., a normal output of 810-850 b.h.p. at 2,250 r.p.m. at 4,000ft., and a take-off power of 920-960 b.h.p. at 2,475 r.p.m. The engines are housed in long N.A.C.A. cowlings with controllable-flap gill cooling. They drive De Havilland three-bladed controllable-pitch airscrews. When not used as part of the composite aircraft *Maia* can be employed as a normal commercial flying boat.

Mercury, the upper component, is a very interesting machine, apart from its functions as part of the composite aircraft. It is an all-metal twin-float seaplane, of the high-



wing cantilever monoplane type. The fuselage has been kept down to a small cross-sectional area in order to get the best possible efficiency, and this has been made possible by the fact that the machine is intended to carry mails only and no passengers. The crew consists of pilot and navigator radio-operator.

The fuselage differs in shape from, but is similar in structural features to, a flying boat hull. That is to say, it has frames and stringers of usual Short type, and the Alclad plating is joggled and flush-riveted so as to form a perfectly smooth surface. The wing root is very neatly faired into the fuselage top, as some of our structural sketches show.

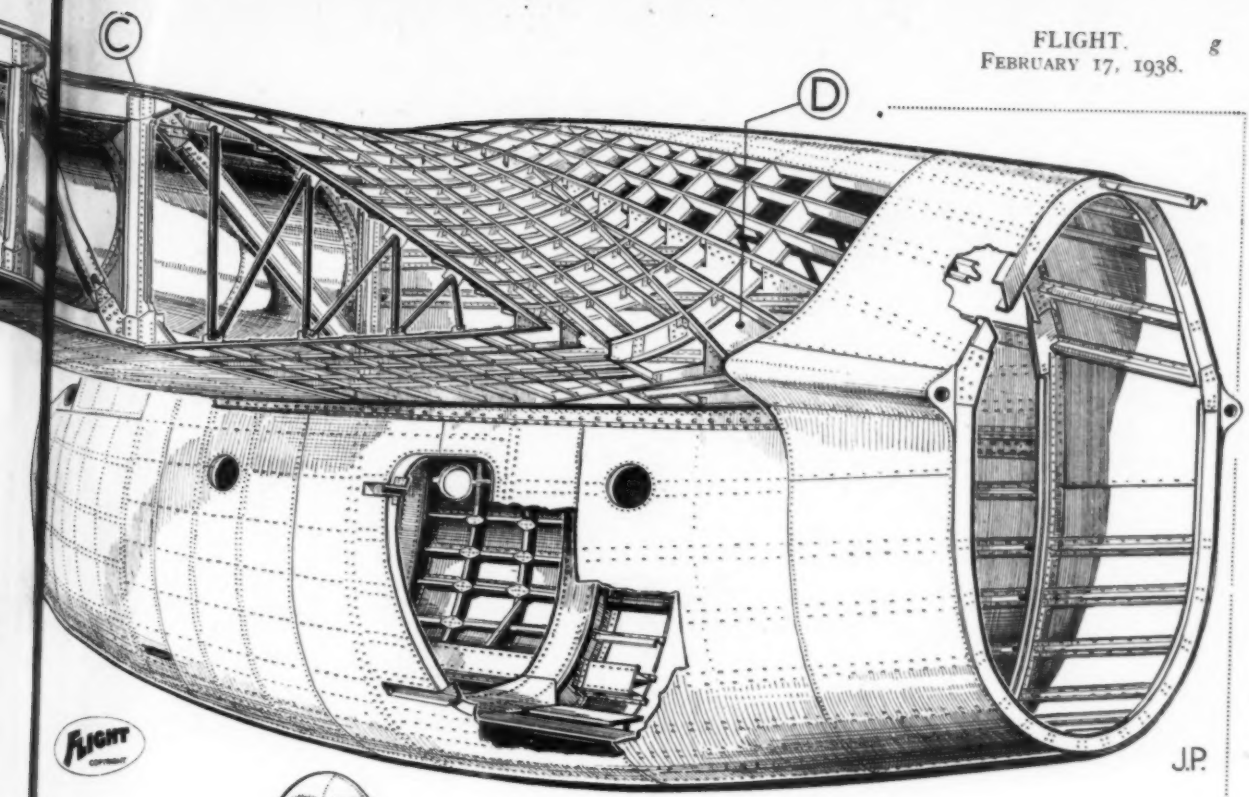
Fundamentally, the wing construction is similar to that of the Empire boats, that is to say, the box spar is made up of corners of extruded T-section tied together by vertical and diagonal tubular struts, the fork-ends of which bolt to the single limbs of the T-sections. However, owing to the fact that the petrol tank arrangement is different, certain changes have been introduced. The 1,200-gallon tank consists of a single cylindrical member, "bent" in the centre to allow for the dihedral angle of the wings. At intervals the tank has diaphragms to prevent the petrol from surging, and flap valves are arranged to open inwards, so that petrol can flow from the outer ends of the tank towards the centre, but not from the centre outwards. Otherwise the fuel might run into the outer portion on one side and cause the machine to capsize. The tank is attached to the wing spar at the diaphragm points, and contributes something to the wing strength, particularly to torsional strength.

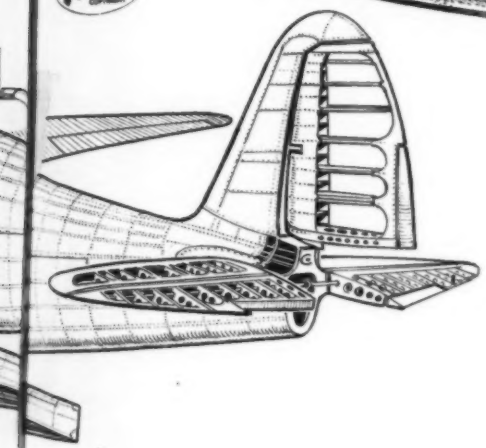
Although the theory is that most of the fuel will be consumed when the machine has to alight, provision has to be made for the event of alighting before any considerable quantity of fuel has been consumed. This emergency has been guarded against by fitting jettison valves in the centre of the tank. From these valves a pipe runs down through the fuselage, and has its lower end projecting slightly beyond the bottom covering, so that the petrol is carried clear. As the point of emergence is below and several feet aft of the engine exhaust pipes, the chances of the fuel catching fire are extremely remote.

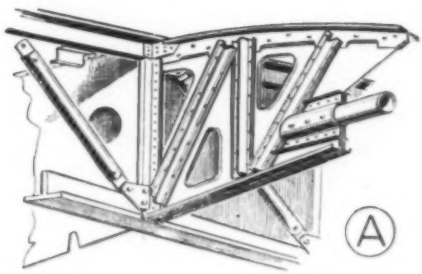
Power for *Mercury* is supplied by four Napier-Halford Rapier engines of the Mark V type. These are air-cooled, with the sixteen cylinders arranged in the form of a letter H, as seen from in front. Each engine gives a maximum output of 340 b.h.p. at 4,000 r.p.m. at 13,000ft., and a normal output of 315 b.h.p. at 3,500 r.p.m. at 10,000ft. They drive two-bladed wooden airscrews.

The floats of *Mercury* are of usual Short shape and construction. Their displacement is not sufficient to support the machine at the fully loaded assisted take-off weight of 20,500 lb. The maximum permissible gross weight which the floats will support is about 14,500 lb., which is the maximum weight at which *Mercury* will take off under its own power.

Full performance figures have not yet been obtained, but from the tests made so far it is estimated that the


C
D
FLIGHT
J.P.

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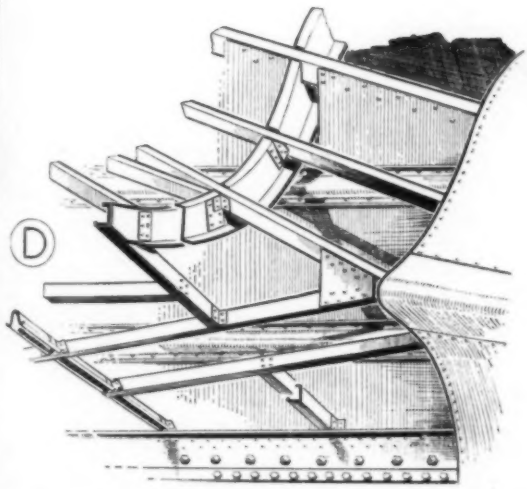
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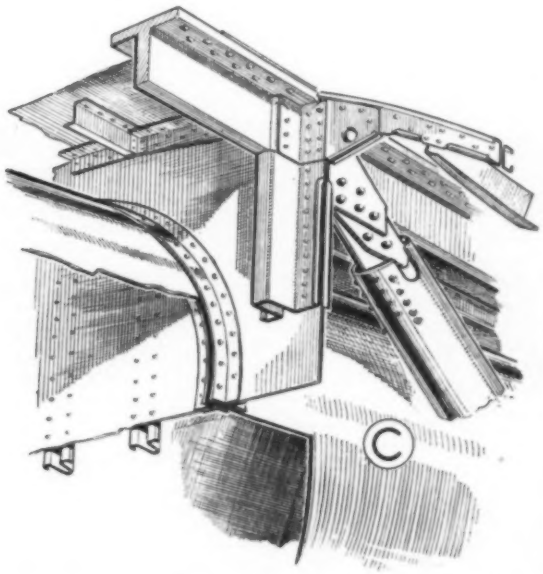
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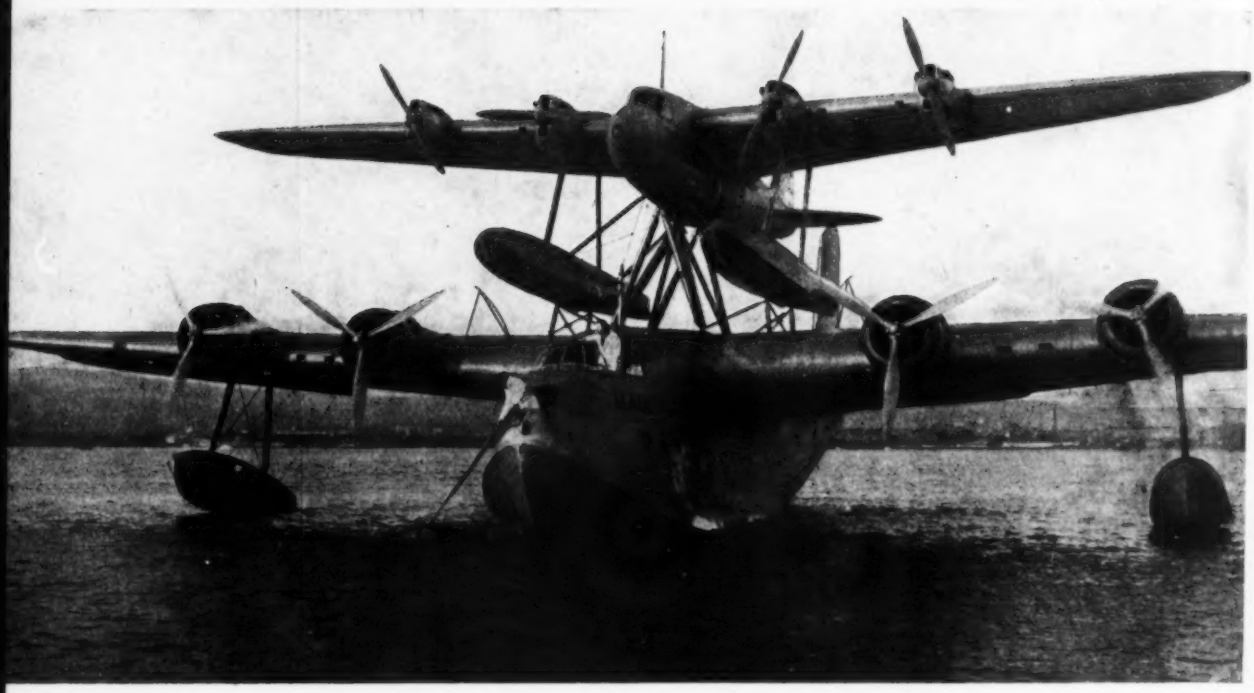


Picking up moorings after a flight. Mr. Lankester Parker is seen in the cabin of *Maia*, while Mr. Piper, who has had to scurry down from his perch in *Mercury*, is in the bow compartment making fast to one of the rubber buoys which are used exclusively at Rochester, and which were the invention of the late Mr. Eustace Short.

range of *Mercury* will be 3,750 miles when carrying a mail load of 1,000 lb. at a cruising speed of 175-180 m.p.h. If this figure is attained it would mean the ability to cross the North Atlantic against an average headwind of 80 m.p.h. *Mercury* has a wing span of 73ft. and a wing area of 611 sq. ft., so that at the maximum gross weight the wing loading will be 33.6 lb./sq. ft. The power loading, based on the normal power of 4×315 b.h.p., will be 16.25 lb./h.p.

Naturally the accommodation on board *Mercury* is somewhat limited. The pilot occupies a seat in the nose of the fuselage, where he is well ahead of the wing and engines. Behind him is the wireless operator, from whose compartment a gangway runs aft to the mail compartment and lavatory.

Unhooking

Interesting details concerning the special equipment installed in connection with the composite feature may now be disclosed. As already mentioned, *Maia* carries on top of her wing a trestle which supports *Mercury*. The support occurs at two points, while in the middle of the trestle is the hook-release mechanism. The two points are, of course, on a fore-and-aft line. The machine is steadied laterally by small supports under the floats. A limited amount of freedom is permitted, so that when a speed has been reached at which *Mercury* carries more than its own weight, the machine is free to rock through about three degrees of incidence. Electric switches incorporated in the two supporting points light and extinguish small indicator lamps in the pilot's cockpit. When one light is " on " and the other " off " it indicates that the machine is " tail heavy." When the lights reverse, the machine is " nose heavy." This indication enables the pilot of the upper component to set his tail until the trim is correct. In front of the pilot is a third light; this shows that the initial release load of 3,000 lb. has been reached.

The release mechanism includes three hooks, of which two are under the control of the pilots, while the third is spring-loaded and operates automatically when a predetermined pull is reached. When the pilots have satisfied themselves, from the lights and the pull indicator, that the excess lift of the upper component is sufficient to ensure separation, they warn one another by the telephones installed that all is ready. The pilot of the lower component then releases his hook; the pilot of the upper component follows suit, and finally the third hook releases automatically. For reasons explained earlier, the lower component tends to drop and the upper tends to climb.

There is a somewhat ticklish period of a few seconds, during which the pilots cannot see one another. Mr. Parker, after the first separation flight, stated that his first sure indication that Mr. Piper had "left" him was the cessation of the noise of the Napier engines of the upper component. For the upper pilot the main worry is that at one instant he has no control over his aircraft at all (his flying controls remaining locked until separation has taken place), and at the next he has full control. If he does not push his stick forward the machine may over-climb, on the other hand, if he pushes it too far forward he may lose a little height and get uncomfortably close to the lower component. On the first separation flight all went well, and the two aircraft separated smoothly and were never in any danger of touching one another.

Possibilities

Another possible source of trouble is that the airflow over the two machines may change when separation has just taken place, and when the composite becomes two separate monoplanes instead of a single eight-engined biplane. No such trouble was, however, noticed on the first separation

Obviously, the separating force required before the automatic hook releases can be made anything desired, depending upon the strength of the spring used. The setting at 3,000 lb. appears to have been a very useful compromise between a too violent and a too sluggish separation.

It is worth pointing out that if, for any reason, the pilots should decide, after pulling their hook releases, to postpone the separation, they can lock their hooks again and make another attempt later This is obviously a very necessary safeguard, since otherwise the automatic hook might release during the landing operation, for instance.

As regards the utility of this particular machine, it is necessary, in order to get a proper perspective, to remember that (a) the machine was produced as a seaplane because Imperial Airways stipulated this type on account of the southern route via the Azores and Bermuda, where there are no aerodromes; (b) that the original conception of the idea antedated the general use of variable-pitch airscrews and trailing-edge flaps as modern aids to efficiency; and (c) that in consequence, the wing loading is the relatively moderate one of 34 lb./sq. ft., whereas modern opinion leans towards 45-50 lb./sq. ft. as desirable for high cruising speed.

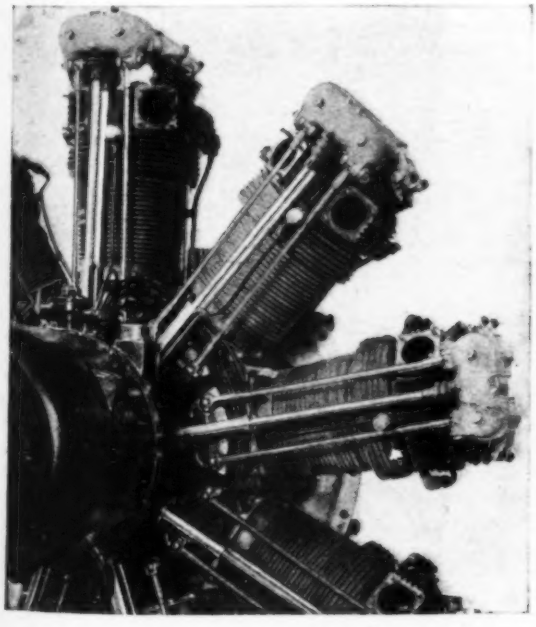
Obviously, the designers of *Mercury* could produce a landplane with retractable-wheel undercarriage, or even possibly with retractable-skid undercarriage, and obtain greater cruising speed, longer range and increased payload. In other words, *Mercury* should be regarded as an experiment in composite launching rather than an actual utility type. Nevertheless, as it stands, *Mercury* is quite capable of doing useful work. For instance, it could do a non-stop flight from England to New York, although, as there is no *Maia* on the other side, it would have to return by stages via Newfoundland and Ireland.

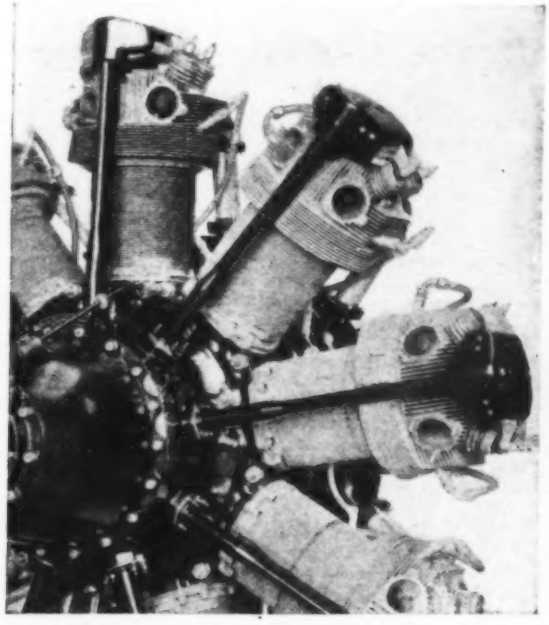
The immediate programme for *Mercury* must obviously include take-off and separation tests at the full gross weight of 20,500 lb. (so far the machine has been "separated" at 14,500 lb. only), and trial flights of rather shorter duration and range, possibly around the coasts of Great Britain and perhaps to Karachi.

It would hardly be fair to close the description without mention of some of the many firms which have contributed their quota, great or small, to the construction of the Short-Mayo. Below is a list of a number of its components and accessories, with their makers.

SOME CONTRIBUTORS TO A NOTABLE EXPERIMENT

Airscrews, v.p.—De Havilland Aircraft Co., Ltd.
Aluminium, sheet, tube, etc.—British Aluminium Co., Ltd.
Anodising.—Technical Platings, Ltd.
Anodising, silver.—British Anodising Co.
Artificial horizons.—Sperry Gyroscope Co., Ltd.
Asbestos-sprayed equipment.—Bell's Asbestos, Ltd.
Automatic pilots.—Sperry Gyroscope Co., Ltd.
Bars, etc., stainless.—Firth Vickers, Ltd.
Batteries.—Britannia Batteries, Ltd.
Bearings.—Hoffman Manufacturing Co., Ltd.
Boat-hooks.—Henry Hughes, Ltd.
Bolts, special.—M.C.L. and Repetition, Ltd.
Bushes, Oilite.—Manganese Bronze and Brass Co., Ltd.
Cables, electric.—British Insulated Cables, Ltd.; Callender's Cable and Construction Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.
Carburation equipment.—H. M. Hobson (Aircraft and Motor) Components, Ltd.
Castings, manganese.—Sterling Metals, Ltd.
Castings, mild steel.—Jessop, Williams and Sons, Ltd.
Chains.—The Renold and Coventry Chain Co., Ltd.
Control cables, etc.—Bowden (Engineers), Ltd.
Controls.—Arens Controls, Ltd.
Controls, hydraulic.—Exactor Controls, Ltd.
Couplings, special, for cables.—Intex Engineering Co., Ltd.
Drives, flexible.—F. Gilman (B.S.T.), Ltd.
Electrical equipment, general.—Rotax, Ltd.
Electrical parts, terminal blocks, etc.—D. H. Bonnella and Son.
Engines, exhaust rings, air-intakes, cowlings, etc.—Bristol Aeroplane Co., Ltd.
Fuses—Joseph Lucas, Ltd.
Greasing equipment.—Tecalemit, Ltd.
Instruments, general.—Smith's Aircraft Instruments, Ltd.
Jointing and cork floats.—Cork Manufacturing Co., Ltd.
Nuts, patent locking.—Simmonds Aerocessories, Ltd.
Parts, A.G.S.—Rubery, Owen and Co., Ltd.; Vickers (Aviation), Ltd.
Parts, special machined.—S. E. Opperman, Ltd.
Phosphor bronze bars.—Phosphor Bronze Co., Ltd.
Radio equipment.—Marconi's Wireless Telegraph Co., Ltd.
Rivets, Duralumin and stainless.—S. and R. J. Everett and Co., Ltd.
Rivets, patent Duralumin.—De Bergues Patents, Ltd.
Rubber sections, expanded.—Expanded Rubber Co., Ltd.
Rubber sheet.—David Moseley and Sons, Ltd.
Screws, light alloy.—Guest, Keen and Nettlefold, Ltd.
Sheet and strip, carbon and stainless steel.—J. J. Habershon, Ltd.
Sheet, stainless.—Firth Vickers, Ltd.; Jessop, William, and Sons, Ltd.
Sheets, aluminium and Duralumin.—Expanded Metal Co., Ltd.
Sheets and bar, aluminium alloy and Alclad.—Northern Aluminium Co., Ltd.
Sheets, Bakelite.—Bakelite, Ltd.
Sheets, Camloy stainless.—L. Cameron and Co., Ltd.
Sheets, Hiduminium.—High Duty Alloys, Ltd.
Shock-absorbers, Lord.—Sperry Gyroscope Co., Ltd.
Sparking plugs.—K.L.G.
Spinnings, aluminium and Alclad.—Cornercroft, Ltd.
Springs.—Geo. Salter and Co., Ltd.
Tubes, Duralumin.—Jas. Booth and Co., Ltd.
Tubes, extrusions, etc., in R.R.56 and steel.—Reynolds Tube Co., Ltd.
Tubes, mild steel and stainless.—Accles and Pollock, Ltd.
Tubing and connections, flexible.—Power Flexible Tubing Co., Ltd.
Tubing, copper.—Birmingham Battery and Metal Co.
Tubing, flexible.—Superflexit, Ltd.
Upholstery and decorations.—L. A. Rumbold and Co., Ltd.
Wheels and tyres for beaching gear.—Dunlop Rubber Co., Ltd.
Window channels and door runner gear.—Beckett, Laycock and Watkins.

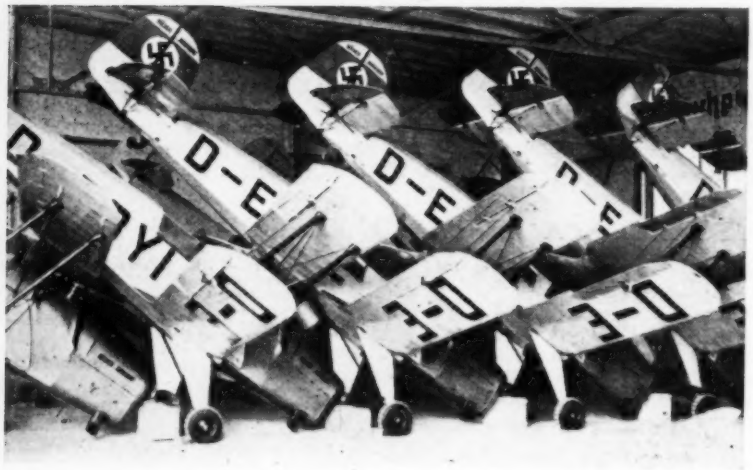




AUGMENTING A RECORD: At the beginning of this year there were still 74 of the early type Bristol Jupiter engines in use by Imperial Airways. They had completed a total of 401,590 hours running and the average distance each engine had flown was 561,328 miles. One engine had actually flown nearly 800,000 miles. This record is now being rapidly augmented by the Pegasus. Although the first of the Empire boats was launched about eighteen months ago, over 76,000 engine running hours have already been completed, and the fleet is at present operating at the rate of between 10,000 and 12,000 engine hours per month. One Pegasus Xc engine has recently completed a total running time of 1,046 hours. These photographs offer an illuminating comparison between the 1929-1930 Jupiter (left) and the Pegasus.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



SANTA CLAUS' WORKSHOP: German Bücker Jungmanns, popular for *ab initio* and aerobatic training, stood on their noses to save hangar space.

IT is rumoured that Col. Lindbergh will go to Spain to study the application of aircraft on the various Government fronts.

An assurance that the supply of instruments for Service machines is satisfactory has been given by Lt. Col. Muirhead.

The annual general meeting of the Royal Aero Club takes place at 119, Piccadilly, at 6.30 p.m., on Wednesday, March 23.

The precise cause of the incident on one of the London flying boats of No. 204 Squadron has not, apparently, been definitely established. It seems, however, that one airscrew broke into three pieces, the hull and one wing being pierced.

Fraulein Hanna Reitsch has given a demonstration of the Focke-Wulf helicopter in the Deutschlandhalle—Germany's great roofed-in assembly centre. Starting from the middle of the arena, she rose vertically, flew to one end of the hall, and made a circuit back to her starting point.

Penalty of fame as revealed in a local paper report: "The presentations over, Mr. Clouston was surrounded by a crowd of autograph hunters. Many had not come prepared with books and produced whatever could be written upon . . . One enthusiast even wanted the signature written on her arm!"

"In recognition of the constructive work of the daily Press, magazine and free-lance writers, and writers for syndicated services, resulting in the mounting public interest in aviation," Trans-Continental and Western Air, the great American transport concern, is offering an attractive annual award of merit to the American writer "who has developed the best informed writing in the dissemination of air information for the year."

At nineteen leading public schools, members of O.T.C.s holding Army "A" certificates are to begin a course under R.A.F. instructors in the principles of flight, meteorology, air photography, interception problems, etc.

No provision has been made for flying training, but cadets will be eligible for passenger flights in Service machines, and for instructional visits to the R.A.F. stations to which they are affiliated. A number of schools already pay visits to Service aerodromes.

The Dewoitine concern is said to be building a long-range machine with a range of nearly 12,500 miles for an attempt on the world's distance record.

Pilot and passengers of a Central Vermont Airways liner flying at 5,000 ft. recently conversed with a gold-mine superintendent 1,800 ft. below the surface and 800 miles away.

There is a possibility that Italy's "Green Mice" squadron of Savoia Marchettis, which covered itself with glory in the Damascus race and on the recent South Atlantic crossing, may attempt a world flight under the command of General Biseo.

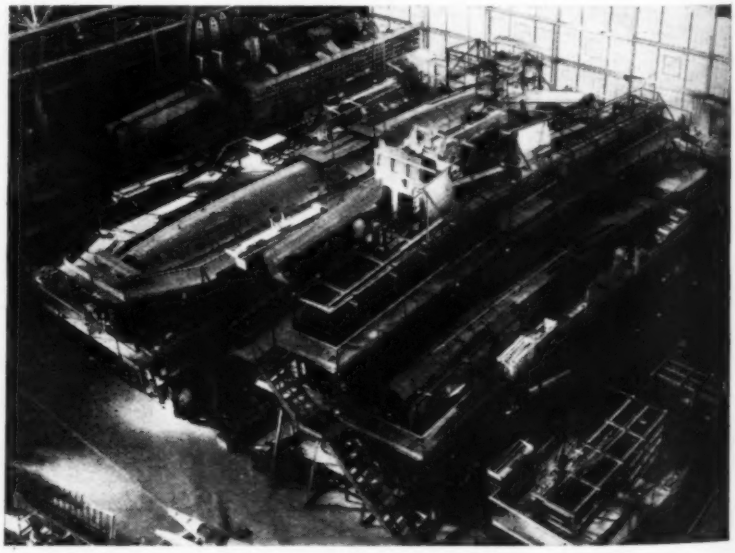
All Lockheed 14s have been grounded in America pending special tests and the report of an accident board appointed to enquire into the cause of the disaster to one of these machines, in which eight passengers and the pilot were killed. Tail flutter is believed to have been responsible.

Congratulations to . . .

Major J. B. L. H. Cordes, Handley Page chief test pilot, on his engagement, recently announced, to Miss Muriel Greenwood.

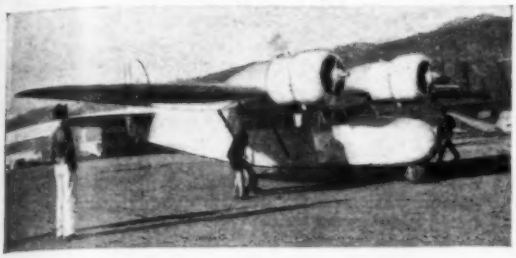
Miss Dorothy Spicer, only British woman holder of Ground Engineers' Licences, on her appointment to a post with the Air Registration Board.

Miss Ann Edmonds, gliding enthusiast, for seizing a dilemma by the horns when it attacked the sailplane which had let her down into Whipsnade Zoo.



D.C.4 TAKES SHAPE: Reminiscent of a power station with its dynamos, a section of the Douglas works is devoted to the construction of the four-engined D.C.4 transport. Fuselage and wings can be seen in separate erection cradles. Weighing 65,000 lb. the machine will carry 42 passengers, a crew of five, several tons of baggage and fuel for a range of 2,200 miles. Production models will have "supercharged" cabins.

COMMERCIAL AVIATION



SOMETHING DIFFERENT FROM THE STATES: First views of the new Timm light transport (two 400 h.p. Wasp Juniors) which has Handley Page slots and a tricycle undercarriage. Spats and other fairings had not been installed when these snapshots were secured. This machine is one of several new American types to be built largely of wood. The top speed is about 200 m.p.h.

THE WEEK AT CROYDON

That Railway Clearing House "Concession": Hot Rhythm, Ice and Orchids: Story (Possibly Apocryphal) of the Good Old Days Over the Channel.

ONE sometimes feels a certain sympathy for the villain of the piece, and I have known a very small boy stand up in the stalls and vociferate: "I hate Peter Pan" when the gallant and genial Capt. Hook was defeated.

This attitude postulates a certain decency in the villain, but no one will mourn the passing of the villain of the civil aviation scene—the Railway Clearing House. For I hear its days are numbered so far as oppressing air traffic companies is concerned.

Something very much stronger than a hint was given to the rail bosses by a High Authority recently, to the effect that the Railway Clearing House ban on bookings for certain air companies was to be lifted forthwith.

Another rebuff, tantamount to a punch in the plexus, was delivered to the puff-puff potentates by certain Members of Parliament the other day. Several private railway Bills were introduced in the good old "We're all pals, here, chaps" spirit. I don't know if the Bills sought plenary powers to cram even more gasping travellers into a carriage during rush hours or were designed to make it a criminal offence to ask the date of birth of a refreshment-room sandwich. Anyway, the Bills were opposed by people who wanted air transport to have a fair deal, and I am told that opposition to railway Bills will continue until the Clearing House ban is removed.

History

In case anyone wants the history of this affair, it may be said that quite a few years back Railway Clearing House, formed by all the railway companies, started the bother. Imperials were too big to touch, so they tried to impose the ban on foreign companies, whose reply, couched in diplomatic phraseology, was to the effect that anyone hunting for a phenomenal, international thick ear was welcome to try to impose just such a ban.

With peevish cries of, "Well, who *can* we oppress, then?" (metaphorically speaking) the rail people had another look round, and picked on certain small British firms then struggling, without subsidy, to show the British flag against subsidised foreign competition on various routes.

Clearing House said to the big London and provincial travel agents, through whose hands about 90 per cent. of passenger and goods traffic by air passes: "If you book for these firms you loose the railway business we give you." The agents, who are decent folk, hated it, but had no option; so when a passenger wanting a ticket on the British airline walked in they had to refuse to serve him and offer him a foreign one instead.

Now, that has been the patriotic contribution of the railway companies to the success of British aviation, despite the fact that they are airline owners themselves; and that is how they have filled in time when not busy naming locomotives after British regiments, unveiling them with enormous Union Jacks and sobbing pure patriotic tears into their top hats on platforms whilst the troops presented arms.

I mention this matter at some length because I am told that now the railroad people see the red light; they are talking as if their removal of the ban was an act of clemency, Christian charity and pure zeal for civil aviation.

Nat Gonella arrived by K.L.M. last week. I saw a Customs official peering suspiciously into Nat's pet trumpet and trying hard to see round the bend in it. Nat hovered around anxiously, in case the officer should call for the official tin-opener, but in the end all passed off harmoniously. I believe the officer only wanted to see the place where Mr. Gonella keeps his wizard music.

North-Eastern Airways carried a whole theatrical company up to Scotland, where they are to tour, and also the Editor of the *Ice Hockey World* up to Perth. So that he should feel quite at home, they scheduled as pilot Mr. Carl Ross, who is an ex-ice-hockey star. Service!

Perishable

A notable bit of perishable air freight from London to Cologne by Imperial recently in a cellophane box, tied with gold ribbon, was three orchids valued at £17 apiece.

I saw somewhere that if the Channel tunnel scheme had come to anything trains would have done 120 m.p.h. through it, which is slow considering that Victorian trains did 100 m.p.h. in the open. Anyway, experts calculated that if one passenger put his head out of the window, in the tunnel, when the train was doing 120 m.p.h. it would need 5 h.p. more to keep up the speed. Which leads to the thought that few people know the bit of secret history of early airline rivalry, when fourteen emissaries of a competitive concern bought tickets on a very slow aeroplane which shall be nameless. At a preconceived signal, they all popped their heads out of the windows, wearing stiff-brimmed sombrero hats, and brought the machine up all standing whilst their own company's aeroplane shot past, thus obtaining the "blue riband" of the English Channel. And that, of course, explains the fact that you cannot open a window in a modern airliner.

Talking of speed, though, the following verbatim extract from a Northern newspaper makes one wonder if progress is as rapid as is generally supposed:—

"Royal Dutch Air Lines have ordered twin-engined monoplanes credited with a cruising speed of 40 m.p.h. and a maximum speed of 265 m.p.h." A. VIATOR.

COMMERCIAL AVIATION (CONTINUED) : WORLD NEWS

Inverness Improvement

INVERNESS authorities have approved plans for a 120 ft. by 70 ft. hangar at the municipal airport at Longman, which is being operated by the Straight organisation. Offices, workshops, stores, and a garage will be included. Steelwork for the hangar will be erected by A. and J. Main and Co., Ltd., Glasgow.

Overweather to the Ovaltinies

CONSIDERABLE progress is being made with the new airport at Esch-Alezette, in the Grand Duchy of Luxembourg, for the operation of which a company was formed in 1937.

The thought occurs that pilots with homing equipment will at least have a powerful broadcasting station on which to depend.

Giving Pilots the Pip

OBSERVATORY-CHECKED time signals are now being transmitted hourly by United Airlines' radio chain to their principal airports at Chicago, San Francisco and elsewhere. These signals are relayed from the airport installations to the intermediate airports and to all machines in the air, thus facilitating both timekeeping and navigational procedure.

R.A.S. Plans

DOUBTLESS a step towards the Maybury "junction" ideal, a new London-Glasgow route will be inaugurated by Railway Air Services in May. It will run *via* Liverpool instead of *via* Liverpool and Belfast as at present, though the latter route—which puts Glasgow 4 hrs. 10 min. from London—will not cease to operate.

Summer services, including those over the main Liverpool-Birmingham-Gloucester-South Coast route, and the Bristol-Plymouth one, will be resumed at the same time.

Freight—and How

WITH their specialised knowledge, and with experience of such varying cargoes as bullion, live stock, flowers, pianos and pieces of machinery (for which last items the company's Curtiss Condor is particularly well suited), International Air Freight, Ltd., are in an advantageous position to give advice on all aspects of goods carriage by air.

Hence the Air Freight Information Bureau, opened last week at 120, Pall Mall, London, W.1. Advice, free of charge, is available there to anybody seeking advice on air freightage to any part of the world.

South Atlantic Statistics

AIR FRANCE continue, for the time being, to rely mainly on their four-engined Farman landplanes for their weekly crossings of the South Atlantic with the South American mail. The first of the five Lioré et Olivier 47 flying-boats which are being got ready with all speed will, it is hoped, be ready this summer, and Air France have announced that passengers will be carried. She is equipped to carry five passengers and a crew of five.

On the last two crossings of the South Atlantic by Farmans, made last week, the two pilots were Guillamet (59 crossings) and Delaunay (48 crossings), and a French statistician has totted up the aggregate number of ocean crossings to the credit of the two crews. These are his figures: 488 crossing of 1,940 miles of ocean; 722,000 miles entirely over water.

Elementary

THOUGH it contains more than a few "blinding glimpses of the obvious" *Notice to Airmen* No. 19, issued last week, has some helpful suggestions on the anticipation of those unpleasant flying conditions when "high speeds should be avoided and, as far as practicable, passengers and other movable load should be secured."

Thus, vertical air currents of a velocity of as much as 50 ft./sec. may be expected in the presence of the following:—

(1) Unusually squally winds at ground level.

(2) Wind direction between north and west.

(3) Clouds of a cumulus type, often building up during the day to considerable heights.

(4) Rapid decrease of temperature with height above the ground.

Much of the Notice is taken up with explaining (with diagrams) how vertical gusts and eddies are caused by ground irregularities, concluding with the observation: "It is advisable, therefore, when there are strong or squally winds, to avoid flying at a low height in the neighbourhood of cliffs or hills with steep slopes."

Imperial Traffic

IMPERIAL AIRWAYS figures, recently issued, show that the total mileage flown in 1937 was 5,860,923, as compared with 5,083,139 in 1936.

Ton-mileage figures for 1937 were 6,871,004, as against 4,868,585 in 1936.

Rhodesia in Line

FROM February 1 Southern Rhodesia came into line with the rest of the British Empire's letter and postcard postage rates. To countries of the African Postal Union and those participating in the British Empire air-mail scheme, letters and postcards are now charged 1½d. per half-ounce.

Denmark's Internal Lines

THE Danish P.L.F. (Provins-Luftfartsselskabet), which operates two interior airlines, flew an aggregate of 112,365 miles on the Aalborg-Copenhagen run in 1937, transporting 1,845 passengers, 9.4 tons of mail and 9.6 tons of freight.

Two triple-engined Fokkers will be put on to this service when the new craft for the D.D.L. foreign services have arrived. On the Copenhagen-Esbjerg run a mileage of 20,000 was attained last year, and 337 passengers carried.

Langstone—Last Word?

THE Langstone Harbour land-and-sea Empire base project has been gaining a painful affinity to the incoherencies of a fourth-rate radio commentator. In other words, for the past two years we have heard: "It's on. It's definite. No, there's some doubt No, it's off. Well, there's some hope . . . Yes, it's on again . . . No, I'm sorry, it's off."

At last it seems that it *is* off. A letter received by Portsmouth Corporation from the Air Ministry indicates that a site may be sought elsewhere—presumably Southampton.

It is understood that no mention was made of the £600,000 which the Government originally offered to contribute towards the cost of the Langstone project.

Saving a Day in Africa

D.E.T.A. Airways of Portugese East Africa are now operating a bi-weekly service between Lourenço Marques and Johannesburg, connecting with Imperial Airways Empire service at the latter place. D.H. Rapides are being used.

Services leave Lourenço Marques on Tuesdays and Fridays at 1 p.m., and in the reverse direction from the Rand Airport, Germiston, on Thursdays and Sundays at 9 a.m., the journey taking approximately 2½ hours.

This new service saves 24 hours in the through journey between London and Johannesburg, as on the existing Imperial Airways schedule between London and Durban passengers have to make a night stop on arrival before continuing by South African Airways services.

Under the revised arrangement Imperial Airways services are scheduled to pass through Lourenço Marques in the morning, and passengers disembarking at that point can arrive in Johannesburg 2½ hours later, thereby cutting off one extra day's flying.

D.E.T.A bookings are being handled in London and South Africa by Parry, Leon and Hayhoe, 2, Conduit Street, London, W.1.

Norwegian News

NORWEGIAN budget estimates for 1938-39 provide an aggregate of 1,850,900 kr. in aid of commercial aviation, of which 915,000 kr is by way of airport subsidies, viz., 590,000 kr. to the Sorlandet airport at Kjevik, 200,000 to the Telemark airport at Geiteryggen, and 125,000 to the Trondheim airport at Heimdal.

This summer the airlines will be subsidised to an extent of about 700,000 kr., the better part of which is swallowed by the coastal air services. No other country in the world, comparatively, invests as much as does Norway in the development of internal air routes. D.N.L. had plans for opening new lines to Stockholm and Amsterdam, but had to abandon the idea in order to concentrate on the Norwegian coastal lines, the running of which keeps four large and two smaller machines fully occupied.

Meanwhile, the private company, Wessels Flyselskap, has applied to the Government for a concession to inaugurate an express service via Oslo-Stavanger-Bergen-Oslo. It is proposed to run one daily schedule with a modern twin-engined six-seater cruising at 300 km./h., in which case the round voyage would take less than four hours.

The TREND of INVENTION

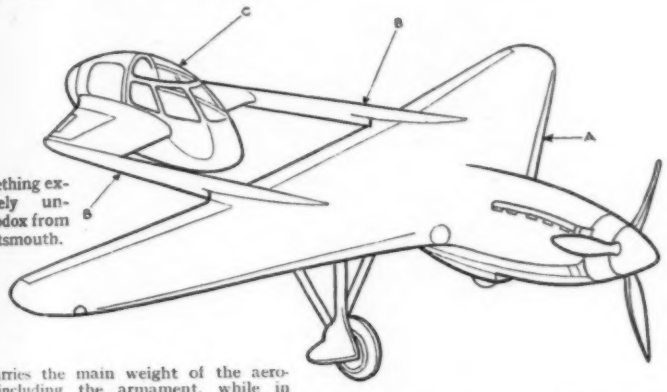
Recent Aeronautical Patents Reviewed

Unorthodox Design

A VERY unusual design of aircraft emanates from a well-known factory and is described in this specification, which claims particular advantages for military purposes. There is no fuselage in the usually accepted sense of the term, the tail structure being connected to the wing by relatively slender booms so as to leave a large open space in the central portion usually occupied by the fuselage. The crew are accommodated in a cabin *in the tail structure*.

This construction leads to a considerable reduction in surface, particularly in the immediate region of the airscrew.

A monoplane constructed in this manner is shown in the illustration. The single wing A carries the engine fuel tanks, landing gear, etc., and B, B are two slender tail booms of tubular construction to which the rear portion C containing the pilots' cockpit is attached. The front portion A



Something extremely unorthodox from Portsmouth.

thus carries the main weight of the aeroplane, including the armament, while in the rear portion, in addition to the crew, there are the elevators and rudder.

The large open space allows the pilot a wide range of vision, since he can see downward between the two portions of the aeroplane and their interconnecting booms and forward above the wings. Provision can also be made for the cockpit seat to be raised or lowered so as to increase the vision range above or below the main plane as required.

For this construction many advantages are claimed, the chief of which is the reduction of friction area. Again, when the pilot is situated in the tail he can carefully watch the wheels as they approach the ground.—*Patent No.* 470650: *Airspeed* (1934), *Ltd., and A. H. Tiltman.*

Flaps and Split Flaps

AS is generally known, flaps are used on the trailing edge of a wing to increase the lift; this is desirable under certain flying conditions, the most important being as follows:—

(a) When taking off, in order to reduce the length of the run. Here increase in lift without increase in drag is required.

(b) On landing, to reduce the landing speed, increase of lift and drag being desirable.

(c) In certain instances during diving, to reduce diving speeds, increase in drag being here more important than increase in lift.

The design of flaps necessary for the first set of conditions differs from that most suitable for the second and third conditions.

In order to arrive at conditions more suitable to all the above conditions auxiliary flaps or split flaps have been used, and a method of control is described in this patent which enables the split flap to be operated when the main flap is in either the faired or the projected position.

Thus four combinations of position are possible:—

(1) Flap faired, split flap faired; for ordinary flying conditions.

(2) Flap projected rearward and downward, split flap faired; for increased lift during take off.

(3) Flap projected rearward and downward, split flap lowered; for increasing lift and drag to reduce landing speed.

(4) Flap faired, split flap lowered; to act as an air brake.

In the illustration the third of the above conditions is shown, i.e., the condition for increasing lift and drag in order to reduce landing speed.

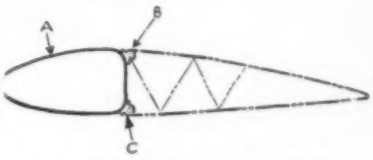
The flap, which is shown at A, is carried by the main wing in curved guides C by cross pieces D and E, and movement is effected by the hydraulic jack F.

The split flap B is pivoted near its leading edge to the flap A and is connected by a link and lever mechanism and a bevel gear with a splined telescopic shaft, one part of which is mounted on the flap A and the other part of the main wing. In this way a torsional movement may be transmitted from the cockpit through the telescopic shaft to operate the split flaps, independent of the position of the main flaps. Balancing arrangements between the split flaps on either side of the aircraft are described.—*Patent No.* 473379: *Fairey Aviation Co., Ltd., and A. C. Brown.*

Wing Tanks

A METHOD of construction is described whereby fuel tanks in wings are so designed that by attachment to the spar booms they take the place of the web of the spar; thus the tank serves the dual purpose of fuel container and also load- and torsion-resisting member of the wing structure.

This leads to a considerable saving in weight, particularly with aircraft requiring a very long range, and at the same time very large quantities of fuel can be carried in a wing of given dimensions. Further, the tanks are readily accessible for inspection and repairs.



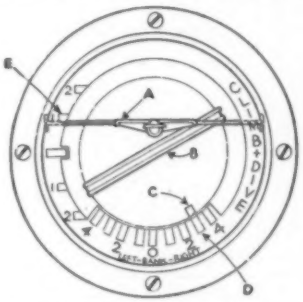
Tank-cum-wing by Vickers-Supermarine.

It will be seen from the illustration that the tank A is made to conform to the profile of the leading edge and is situated in front of the spar, the booms of which are shown at B and C. The rear of the tank is arranged vertically between these booms and is attached to them by lugs; this side thus forms the web of the single spar. Alternatively, separate webs may be used, in which case the tanks are made separate and are easily detachable. The portion of the wing extending aft of the spar is made in the usual manner.

Instead of the tank forming the leading edge it may occupy an intermediate position, in which case the leading face of the tank supports the boom and, if there is a two-spar construction, the tank will extend between them.—*Patent No.* 472839: *Supermarine Aviation Works (Vickers), Ltd., and R. J. Mitchell.*

Blind-flying Instruments

IT is very desirable that instruments used for blind flying, such as the gyroscopic artificial horizon, should be capable of being easily read by the pilot, and that no mental effort should be required to interpret the indications given, in order to appreciate the

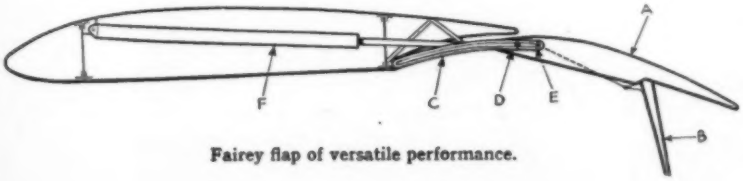


Clear artificial-horizon indication (Sperry).

actual movements of the aeroplane that are taking place. In many cases reversing mechanisms have to be employed, in order that an actual climbing movement may not appear as a downward pitching movement.

In this Sperry patent an instrument is described in which both roll and pitch are indicated in a visual manner, no mental reversal being necessary on the part of the pilot, and no reversing means being employed in the instrument itself.

In one form, the face of the instrument appears as in the accompanying illustration. A miniature aeroplane is shown at A, while the reference wires B represent a horizon. The illustration shows that the aircraft is climbing, since the aeroplane A is above the wires B, and it is also banked to the right, since the right wing has dipped down. The amount of bank is indicated by the index C on scale D and the amount of climb by the position of the tip of the wing on the scale E.—*Patent No.* 473688: *Sperry Gyroscope Co. Inc.*



Fairey flap of versatile performance.

SERVICE AVIATION

Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad

THE HURRYCANE : The production-model Hawker Hurricane of the type which made the fine flight recorded below.

Turnhouse—Northolt in 48 Minutes

SQN. LDR. J. W. GILLAN, O.C. No. 111 (Fighter) Squadron, flew from Turnhouse, near Edinburgh, to Northolt in 48 minutes last Thursday, February 10. The distance of 327 miles was thus covered at a speed of 408.75 m.p.h. His machine was a Hawker Hurricane (Merlin engine) and it carried full military equipment and a normal load of fuel.

The flight was made in darkness, for Sqn. Ldr. Gillan took off at 17.5 nours and landed at 17.53 hours. He obviously made full use of the new Service blind-flying panel with which the Hurricane was equipped; the instruments grouped are a gyro-horizon and directional gyro (Sperry), rate-of-climb and air-speed indicators (Smith's), turn-and-bank indicator (Reid and Sigrist), and Kollsman-K.B.B. sensitive altimeter.

Most of the flight was made, without oxygen, at 17,000ft., an altitude which might affect an untrained person, but which should not—and in the present case did not—cause discomfort to a fit Service pilot.

Sqn. Ldr. Gillan flew on a bearing of 167 deg. true, while the following wind, which was blowing at a strength of at least 50 m.p.h., was on a bearing of 310 deg. true. The engine was not run at full throttle. During the flight the windscreen became coated with frost, and the pilot could not see landmarks until he reached Bedford, when he began to glide down. He landed with the aid of one landing light and a set of flares.

A flight of three Hurricanes of No. 111 (F.) Squadron recently made the same flight in an hour.

Strife in the West Country

TO cater for the demands of Expansion the Air Ministry is seeking sites for about half a dozen more inland bombing ranges. These are required within reasonable distance of certain areas to provide practice for groups of neighbouring squadrons, and it is proving far from easy not only to discover suitable sites, but to reconcile local authorities and residents to the scheme.

There is a prevalent, though totally erroneous, idea that the establishment of such ranges means processions of noisy aeroplanes dropping devastating bombs at considerable danger and inconvenience to local residents and farmers. The facts are as follows :

The belief that live bombs are used is entirely fallacious, there being special areas out at sea for full-scale practice. The bombs dropped on inland ranges are small 8½-lb. canisters filled with stannic chloride which is released by a detonator, the resulting puff of white smoke permitting accurate spotting. Bombing is not normally done on such ranges from an altitude below 6,000 feet, the smaller danger area offered by an aerodrome being adequate for practice from lower altitudes. Dive-bombing practice, too, is normally done over an aerodrome.

The site for an inland range should be a flat or concave piece of ground (so that observers may ensure that the range is clear of trespassers during practice) 2,000 yards in diameter.

In recent months the Air Ministry has been examining areas of land in Dorset with a view to providing a range for a group of neighbouring squadrons. Five sites were examined but did not satisfy all requirements, and when a sixth site—at Crichel—was considered and found to be technically suitable, local objection was raised and an alternative situation near Blandford was suggested. Blandford residents and authorities manifested similar displeasure and after several weeks of meditation the Air Ministry decided to hold a demonstration of practice bombing at Porton Ranges, near Boscombe Down, to "illustrate how little practice bombing would affect the amenities of either locality and to facilitate an agreed settlement."

Representatives of Lord Alington, the Blandford Town Council, East Dorset Joint Planning Committee and the residents of Crichel accordingly foregathered on the windswept Porton range to witness a Hind drop eight bombs. The pilot was forced by cloud to fly abnormally low—little more than 1,000ft.—which did not permit the fullest advantage to be taken of the course-setting bomb sight and this fact, added to the force of the wind, accounted for the first bomb falling about 400 yards from the target. Subsequent projectiles fell some yards nearer. The assembly seemed to take a poor view of the margin of error (though the safety area guaranteed them is more than ample) ; they regarded the drifting smoke with disfavour; they were cold; the demonstration was not very exciting; and altogether the occasion was not a happy one.

One welcomed the visit to Porton, however, because it afforded an opportunity to examine the workings of a typical bombing range. Briefly, there are quadrant sights at two positions, each of which takes a bearing on the "explosion" enabling the accuracy of the bombing to be calculated to within close limits. The main quadrant hut is in telephonic communication with the second sighting position, the operator of the quadrant recording his own readings and those 'phoned to him. Extending from this main hut are electric cables for lighting the target with a ring of lights for night bombing. By day the target is a ring of chalk fifty yards across.

Station Administration

THE R.A.F. Station, Boscombe Down, will be transferred from No 4 (Bomber) Group to No. 1 (Bomber) Group, with effect from April 20.

The R.A.F. Station, Worthy Down, will be transferred from the Bomber Command to the Coastal Command and placed in No. 17 (Training) Group, with effect from April 20.

British Legion and the Balloon Barrage

SURREY branches of the British Legion have unanimously agreed to assist in raising a balloon barrage squadron of the Auxiliary Air Force. The squadron will form part of the scheme for the defence of London, and will consist of one officer and 66 N.C.O.s and airmen of the Royal Air Force and 11 officers and 527 N.C.O.s and airmen of the Auxiliary Air Force.

SERVICE AVIATION (CONTINUED)

Courses at Camberley

WING Cdr. W. E. Theak, *p.s.a.*, and Sqn. Ldr. W. B. Bennett have completed courses at the Army Staff College, Camberley. Sqn. Ldr. Bennett will accordingly have the symbol *q.s.* after his name in the *Air Force List*.

A School for General Reconnaissance

THE School of General Reconnaissance will form at Thorney Island on April 4. From that date, instruction in general reconnaissance will cease at the School of Air Navigation, Manston.

Dental Officers

THE undermentioned dental officers have been selected for permanent commissions:—

Flt. Lts. William Vernon Anthony Denney, L.D.S., and Francis Frederick Kennedy, L.D.S.

C.F.S. Categories

THE undermentioned reserve officers have recently been tested at the Central Flying School and are awarded the following categories:—

A.2.—Flt. Lt. J. A. Dobson and F/O. R. G. Weighill.

B.—Flt. Lt. M. V. Gibbon and F/O. R. T. S. Morris.

Port Said Reunion Dinner

THE sixteenth annual reunion of the Old Comrades' Association, R.N. Seaplane Base, Port Said (including H.M.S. *Ben-my-Chree, Raven, Anne, Empress* and *City of Oxford*), will be held in London on Saturday, February 19. Particulars may be obtained from Mr. Norman M. Williams, 16, Shrewsbury Avenue, London, S.W.14.

Volunteer Reserve Mess at Hatfield

AN R.A.F. Volunteer Reserve Mess has been formed at Hatfield Aerodrome by No. 1 Elementary and Reserve Flying Training School, and an inaugural lance is to be held in King Edward Hall, Regent's Park Road, Finchley, N.3, on Friday, February 25. Tickets are 5s. each and may be obtained upon application from Sgt. V. W. Berg, "Berwyn," Ashurst Road, Cockfosters, Barnet, Herts.

A Reserve of Nurses

IN order to supplement Princess Mary's Royal Air Force Nursing Service in time of emergency, it has been decided to recruit a reserve of fully trained and State-registered nurses.

Candidates must be between the ages of 24 and 40, single, or widows without children, and be prepared, in a national emergency, to serve at home or abroad. Candidates will be enrolled for a period of three years, which may be extended from time to time, and when mobilised will be eligible for promotion. When called up for service members will be issued with an allowance to cover the cost of providing and maintaining uniform and will be entitled to receive pay ranging from £80 a year in the case of a staff nurse to £140 in the case of a senior sister. In addition, an allowance is issuable to cover washing and board and, where quarters, fuel, etc., are not available, allowances in lieu are payable.

Membership does not entail any period of annual training, but arrangements will be made to enable members to do duty in a Royal Air Force Hospital for a week or a fortnight if they wish. Regulations of entry and application forms may be obtained on application to the Matron-in-Chief, Princess Mary's Royal Air Force Nursing Service, Air Ministry, Adastral House, Kingsway, London, W.C.2.

CAUSE OF THE STRIFE: On the previous page is recorded the dissension of Dorset authorities and residents over the proposal to establish a bombing range in their locality. The Air Ministry has explained that only 8½lb. practice bombs, of the sort seen here, would be used.

No. 26 (Training) Group

THE headquarters of the Superintendent of the Reserve and Inspector of Civil Flying Training Schools was renamed No. 26 (Training) Group with effect from December 1, 1937. It is responsible for the training at the following Elementary and Reserve Flying Training Schools: No. 1, Hatfield; No. 2, Filton; No. 3, Hamble; No. 4, Brough; No. 5, Hanworth; No. 6, Sywell; No. 7, Desford; No. 8, Reading; No. 9, Ansty; No. 10, Yatesbury; No. 11, Perth; No. 12, Prestwick; No. 13, White Waltham; No. 14, Castle Bromwich; No. 15, Redhill; No. 16, Shoreham; No. 17, Barton; No. 18, Fairoaks, Woking; No. 19, Gatwick; No. 20, Gravesend; No. 21, Stapleford Abbotts.

Permanent Commissions

THE following short-service officers have been selected for specialist courses with a view to obtaining permanent commissions in the general duties branch:—F/O.s Fleming, C. N., Samson, B., Burns, R. E., Churchill, A. J. F., Pettit, J. A. E., Millar, J. C., Voyce, J. B., Groom, A. D., Irens, H. J., Burgis, F. S. D., Fidler, G. M., Parnaby, G. S. A., Mitchell, C. H., Oats, V. R., Morris, B. G., Smith, S. R. R., Richmond, G. A., Vickers, T. R., Welland, R. D., Crawford, R. C.

The following Flying Officers have been selected for non-specialist permanent commissions:—Black, J. B., Corkery, M. P. C., Cruickshanks, G. L., Edwards, R. I. K., Fothergill, C., Garvin, G. D., King, C. F., Nedwill, R. J. C., Oliver, D. C., Pinfold, H. M., Sharp, R. E., Woodhouse, H. de C. A.

Royal Air Force Gazette

General Duties Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—A. Green (January 14); R. Leigh (Lt., Royal Artillery), J. W. Deacon (Lt., Worcester Regt.), (Seny., January 21, 1937), (January 21); J. R. Jeudwine, K. E. Cornabe, D. Saward (January 28). Sqn. Ldr. G. E. G. Lywood is placed on the retired list at his own request (February 1); Flt. Lt. E. B. Grace is transferred to the Reserve, Class A (February 1); Flt. Lt. C. F. Newcombe is transferred to the Reserve, Class C (January 30).

Medical Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant with effect from January 4 and with seniority of the dates stated:—J. C. Taylor, M.B., Ch.B.; W. T. Buckle, M.B., Ch.B., E. S. Sidey, M.B., Ch.B. (January 4, 1937); J. D. Milne, L.R.C.P. and S. (July 28, 1937); S. Paul, M.R.C.S., L.R.C.P. (August 24, 1937); H. O'B. Howat, M.B., Ch.B. (January 4).

Princess Mary's Royal Air Force Nursing Service

Sister Miss E M. Murphy is placed on the retired list on account of ill health (February 4).

Royal Air Force Reserve

Reserve of Air Force Officers

General Duties Branch

The following are granted commissions as Flight Lieutenants in Class C with effect from the dates stated:—Capt. G. F. M. Warner (R.A.R.O.), (July 27, 1937); Maj. T. G. Hungerford (R.M., Ret.), (December 13, 1937). Maj. H. J. Eastwood, M.C. (R.A.R.O.); Maj. D. Hodson (I.A. (Sp. U.L.)), (December 15, 1937); Capt. A. R. Smeathers (R.A.R.O.), (December 20, 1937); Maj. C. M. Lister, M.C. (R.A.R.O.), (December 29, 1937); Lt. A. G. D. Alderson (January 5). Flt. Lt. H. V. Horner is transferred from Class A to Class C (September 26, 1937). Flt. Lt. E. M. Thompson relinquishes his commission on appointment to a commission in the Auxiliary Air Force (January 3).

Auxiliary Air Force

General Duties Branch

The following are granted commissions as Flight Lieutenants (January 3):—Flt. Lt. E. E. Ellison (R.A.F.O.), Lt. V. C. Grenfell (R.N., Ret.), E. M. Thompson.

SERVICE AVIATION (CONTINUED)

Royal Air Force Appointments

General Duties Branch

Air Commodore.—F. G. D. Hards, D.S.C., D.F.C., to H.Q., Coastal Command, Lee-on-the-Solent; for duty as Air Officer-in-Charge of Administration, 24.1.38.

Group Captains.—M. Henderson, C.I.E., D.S.O., to H.Q., Training Command, Market Drayton; for duty as Senior Equipment Staff Officer, 15.1.38. K. R. Park, M.C., D.F.C., A.D.C., to R.A.F. Station, Tangmere; to command, 3.1.38.

Wing Commanders.—S. B. Harris, D.F.C., A.F.C., to R.A.F. Station, Hucknall; to command, 17.1.38. H. J. Collins, to Directorate of Personal Services, Air Ministry, 2.1.38. F. H. E. Reeve, to H.Q., No. 11 (F.) Group, Uxbridge; for Signals duties, 19.1.38.

Squadron Leaders.—J. W. Gillan, to No. 111 (F.) Squadron, Northolt; to command, 20.10.37. J. A. McDonald, to Directorate of Signals, Air Ministry, 26.1.38. R. S. Blucke, to H.Q., Bomber Command, Uxbridge; for Signals duties, 17.1.38. W. Smith, to Directorate of Signals, Air Ministry, 3.12.37. A. J. Brister, to Directorate of Signals, Air Ministry, 3.12.37. H. J. Walker, to R.A.F. Station, Lee-on-the-Solent; for Engineer duties, 10.1.38. W. T. Holmes, to Directorate of Operations and Intelligence, Air Ministry, 15.1.38. A. C. Mitchell, to No. 7 F.T.S., Peterborough; for duty as Chief Flying Instructor, 17.1.38. M. Wiblin, to R.A.F. College, Cranwell; for flying duties in Advanced Training Squadron, 12.1.38. H. I. Cozens, to No. 19 (F.) Squadron, Duxford; to command, 1.1.38. R. L. R. Atcherley, to H.Q., Training Command, Market Drayton; for Air Staff duties, 1.1.38. I. O'B. MacGregor, to No. 4 (A.C.) Squadron, Odiham; to command, 15.1.38. C. R. Hancock, D.F.C., to Directorate of Staff Duties, Air Ministry, 15.1.38. F. M. V. May, to D.T.D., Air Ministry, 15.1.38. F. E. Bond, to H.Q., Coastal Command, Lee-on-the-Solent; for Personnel Staff duties, 17.1.38. F. G. Cator, to No. 113 (B.) Squadron, Grantham; to command, 7.1.38. D. L. Evans, M.C., D.F.C., to No. 5 F.T.S., Sealand; for Administrative duties, 4.1.38.

Flight Lieutenants.—W. C. Cooper, to Special Duty List; whilst employed at Royal Aircraft Establishment, South Farnborough, 20.12.37. F. R. Drew, to No. 228 (G.R.) Squadron, Pembroke Dock, 14.12.37. E. Foster, to No. 74 (F.) Squadron, Hornchurch, 5.1.38. H. W. Marlow, to C.F.S., Upavon, 6.1.38. W. P. Welch, to School of Air Navigation, Manston, 4.1.38. D. P. Barclay, to No. 211 (B.) Squadron, Grantham, 13.1.38. A. T. D. Sanders, to No. 10 F.T.S., Tern Hill, 5.1.38. M. F. B. Read, to R.A.F. Station, Aldergrove, 13.1.38. E. C. W. S. Smith, to H.Q., No. 26 (Training) Group, Hendon, 24.1.38. M. B. Edwards, to No. 53 (A.C.) Squadron, South Farnborough, 17.1.38. H. M. Cox, to No. 50 (B.) Squadron, Waddington, 17.1.38. P. F. Canning, to Station Flight, Abingdon, 10.1.38. T. W. Hodgson, to No. 4 (A.C.) Squadron, Odiham, 23.12.37. R. E. Barnett, M.B.E., to School of Naval Co-operation, Ford, 13.1.38. A. C. P. Carver, to No. 43 (F.) Squadron, Tangmere, 23.1.38. W. G. Devas, to No. 66 (F.) Squadron, Duxford, 22.1.38. D. W. H. Gardner, to No. 88 (B.) Squadron, Boscombe Down, 19.1.38. W. B. Murray and A. R. Collins, to School of Photography, South Farnborough, 2.1.38. E. A. Howell and G. A. V. Knyvett, to No. 1 A.A.S., Eastchurch, 16.1.38. T. R. Vickers, to H.Q., No. 3 (B.) Group, Mildenhall, 10.1.38. B. Paddock, to School of Air Navigation, Manston, 27.12.37. G. F. W. Heycock, to Experimental Section, Royal Aircraft Establishment, South Farnborough, 14.1.38. W. N. Ash, W. F. Beckwith, R. G. R. Buckley, J. R. MacLachlan, E. Shipley, W. D. Woods and T. G. Young, to Home Aircraft Depot, Henlow, 3.1.38.

Equipment Branch

Wing Commander.—W. A. Kingston, to H.Q., Fighter Command, Stanmore; for Equipment Staff Duties, 19.1.38.

Squadron Leaders.—F. A. Skoulding, to Directorate of Equipment, Air Ministry; for Equipment (Stores) Staff duties, 8.1.38. B. W. Hemsley, M.B.E., to No. 1 A.A.S., Eastchurch; for Equipment duties, 16.1.38.

Flight Lieutenant.—J. E. R. Sowman, to Directorate of Equipment, Air Ministry, 1.1.38.

Accountant Branch

Squadron Leaders.—W. W. Deane, to H.Q., Training Command, Market Drayton; for Accountant duties, 25.1.38. C. G. Prior, to No. 10, F.T.S., Tern Hill; for Accountant duties, 17.1.38. S. C. George, to R.A.F. Station, Lee-on-the-Solent; for Accountant duties, 18.1.38.

Flight Lieutenant.—J. L. Armstrong, to R.A.F. Station, Andover, 21.1.38.

Medical Branch

Wing Commanders.—T. V. O'Brien, to No. 2 F.T.S., Brize Norton; for duty as Medical Officer, 22.1.38. R. S. Overton, to H.Q., Training Command, Market Drayton; for duty as Medical Officer, 25.1.38.

Squadron Leader.—L. Freeman, to R.A.F. Hospital, Cranwell; for duty as Medical Officer, 20.1.38.

Flight Lieutenants.—D. J. Sheehan, to R.A.F. Station, Biggin Hill, 25.1.38. F. W. P. Dixon, M.B.E., to Central Medical Establishment, London, 26.1.38. J. F. Sandow, to R.A.F. Station, Gosport, 28.1.38.

Dental Branch

Flight Lieutenants.—L. E. Bellsham-Revell, to No. 7 F.T.S., Peterborough, 31.1.38. V. H. Weeks, to R.A.F. Station, Abingdon, 17.1.38.

* *Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.*

FOREIGN SERVICE NEWS

Battleships and Bombers

SENATOR ROBERT R. REYNOLDS recently told the U.S. Senate that for every battleship costing sixty million dollars the Government could buy nearly 200 modern bombers which could be shuttled from California to the Atlantic Coast in a fraction of the time and at the same expense involved in the movement of one surface ship between the two areas. The Senator revealed that a Boeing B17 bomber (four Wright Cyclones) costs about 300,000 dollars fully equipped. To quote his speech: "... a fleet of bombers could leave San Francisco this morning at six o'clock and at six o'clock to-night 200 birds of battle, with steel beaks, would be cruising over New York City."

The other day Admiral Leahy, of Naval Operations, announced that "it is the opinion of the navies of the world that the modern battleship is the best defence against air attack." The Admiral could not have been far wrong in his stated belief that the American Navy has the best-trained and most efficient air service in existence. It may take special pride in its squadrons of consolidated patrol bombers, which have made some meritorious long-distance flights.

Mr. Kashimura Regrets . . .

READERS will remember the startling photograph which appeared in *Flight* of January 20, showing a Mitsubishi fighter returning to its base with one wing almost completely shot away. Now from a Japanese correspondent comes an account of the incident that deserves quotation exactly as received:

'In an air raid on Nanchung on December 9th, 1937, 3rd warrant officer, Mr. Kashimura, one of Naval fighter pilots, escorting our group of bombers, engaged in an air combat with many of Chinese fighters on the sky of Nanchung. He brought down one of their Curtiss Hawks, but the next moment his machine came into collision with one of enemy planes. Both planes lost their balance in the air and fell to the ground. The Chinese fighter clashed into the ground, but Mr. Kashimura managed to recover his balance scarcely on the surface of the ground by his skilful work and escaped from clashing. And, he bravely succeeded in returning safely, flying 600 kms. back to his base on the damaged plane, which was deprived of almost half of left main wing. Arriving his base he is said to have remarked as follow: "Sorry, I lost my half wing."

JAPANESE "HEAVY": A heavy bomber of the Japanese Navy believed to be of the Navy 96 type. The engines are B.M.W.s of old vintage built under licence.

GIPSY-WISE to BUDAPEST

A Light-hearted Tale of a Summer Tour

By the HON. RUTH COKAYNE

WE were on the aerodrome at 9 a.m., determined to make an early start from Brooklands and get as far across the Continent as we could in a Gipsy Moth in one day; but we had foolishly neglected to have a "dress rehearsal," and one of our small but vitally important items of luggage refused to fit in anywhere. Neither of us was prepared to leave anything behind, and the argument was becoming somewhat heated when one of the ground staff miraculously produced a cardboard box of most congenial shape and size which solved our problem, with only one pair of shoes over. The shoes were squeezed into the locker somehow, though they subsequently jumped out unceremoniously at every Customs aerodrome from Lympne to Budapest.

At Lympne we were kept on the ground until late in the afternoon as weather reports from the other side were distinctly uninviting. We were entertained by stories of the awful fates of those who land on foreign military aerodromes and the exorbitant cost of recovering wrecked machines and returning the salvage to its country of origin! We began to feel a bit dubious, but before we had time to change our minds a strong tail wind had us across the Channel and ducking under the low clouds on the other side. Visibility was rotten, and we weren't at all sorry to see Brussels. Very many thanks to the two charming Imperial Airways pilots (whose names I have forgotten) who introduced us to "Harry's Bar," showed us the town and gave us a grand time.

In Sheep's Clothing

After picking our way through seven thunderstorms in an open Gipsy Moth we were not feeling too fussy about aerodromes, but, remembering the awful warnings we had received, we did pause to make another circuit of Frankfort. The machines on the ground appeared to be a disorderly collection of small airliners and private cabin machines of various colours. Nothing very military about that, so we landed forthwith.

On closer inspection, those decorative enclosed machines were seen to be bristling with guns in all directions, and a moment later we were subjected to a wholesale confiscation of everything we possessed except the clothes we stood up in. Passports, carnet, tryptique, journey log book, pilot's certificate, insurance papers, travellers' cheques, cameras, everything had to be minutely examined and noted in about half a dozen different ledgers. We were impressed. Then they started copying out the names of all the different places where we could cash our travellers' cheques, but got no further than Barcelona. We were not impressed.

Knowing only three words of German (which seemed to be entirely out of place), I had to rely upon Ruth Lambton [right, in picture above.—ED.] to interpret. She struggled bravely, but translated very little; so when we were marched across a great courtyard I did not know whether we were to be lined up against the end wall with our eyes mercifully bandaged or were merely being taken to the police station. It was with surprise and relief, therefore, that we found ourselves in the officers' mess, where the entire squadron shook our hands with the utmost solemnity, clicked heels, Heiled Hitler and gave us lunch! Another round of handshakes, our belongings were duly returned to us, and we Heiled Hitler gratefully ourselves as we taxied off.

Thunderstorms loomed up in front of us with amazing regularity, and we wound a very wiggly way to Munich, Ruth map-reading like a hawk and me trying frantically to lay off a new course every five minutes. We missed a rather unexpected gasometer and landed in a cloudburst. Enough for one day.

Five Riotous Days

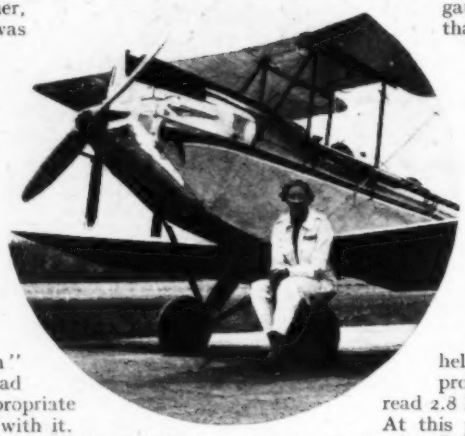
Summer came on a Monday last year, and it was very good while it lasted. We flew to Salzburg, where they let us unseal our camera and take some photographs, served us coffee and wouldn't let us pay for it, and followed us out on to the aerodrome with apples in case we got hungry in the air! It was perfect flying weather. We lunched at Vienna, had tea at Budapest, and put the machine away for five riotous days.

It was winter again when we left.

Our departure was somewhat delayed by dropping a packet of non-safety matches down the tail. It took about two hours to extract them. I *think* they're all out. We got a fairly good weather report and took off after saying fond farewells to all our friends, but after ten minutes' flying we had to turn back on account of low clouds on the hills. Four hours later we tried again, but were stopped by the second range of hills. We climbed up through a gap to have a look over the top, with the result that we shot down again through our gap before it closed in, and returned to Budapest feeling rather foolish. They thought it was a great joke—"So you like Budapest, yes? You cannot fly away from us? But that is delightful; you will stay here a long time perhaps?"

Eventually we took to the water and flew up the Danube, popping in and out of Czechoslovakia indis-

criminately, and landed at Vienna at sunset. Between Vienna and Linz we struck a particularly nasty patch of weather, and on one occasion the machine was completely surrounded by lightning. "Did you see that?" we chorused down the telephones. After a lengthy conversation we decided that we must definitely have become "statically charged," but we din't know what it meant and soon forgot all about it.



At Linz I learnt two new words in German, "Too much." (Might come in useful with the other three some time.) We said "Zu viel!" over and over again in our dilemma. The trouble was that we had found the "Shell men" so reliable everywhere that we had simply said "Refuel" in the appropriate language, and left them to get on with it. But here at Linz our confidence had been badly misplaced. He had proceeded to replenish the oil on the same principle as the petrol, i.e., go on pouring till it overflows, then you know it's enough. We just managed to stop him putting the eighth litre in, by which time the dipstick showed three inches over the "full" mark. Problem, how to get it out again.

We removed the engine cowling, and were confronted with about seven different possibilities, at least six of which must be wrong. Nobody seemed to know much about a Gipsy engine; alas! not even the pilots. Linz boasts a Junkers all of its own, so we decided to wait until it came in complete with mechanic and get him on to the job. He made a bee-line for one of the drain plugs and had the split pin out and the cap off in a few seconds, with a can ready to catch the oil.

"Plonk-plonk!" went something into the can, followed by a healthy stream of oil. Ruth and I exchanged anxious glances. After six litres had been drained from the engine we rescued "plonk-plonk" from the first can and studied them with interest: A long spiral spring and a curiously shaped object like a thimble with a spike on the end. We handed them to the Junkers mechanic, who shrugged his shoulders and then obligingly put them back for us and screwed everything up again. Result, no oil pressure.

By now we had a large audience of air-minded villagers, policemen, motor mechanics and small boys. Popular opinion had it that our oil gauge must be faulty. We insisted that it had been perfectly all right when we landed, and that the two curious objects referred to must have been replaced wrongly. So out they came again. After about six shots we got some oil pressure, but to our amazement only ten pounds. It now appeared that there was something to be said for the faulty oil-gauge theory, but how were we to test it? The motor mechanic came to the rescue this time by purloining the oil gauge from a German car, removing our own, and effecting a temporary exchange with the help of a piece of rubber tubing. The prop was swung again, and we now read 2.8 kilogrammes per square centimetre. At this point we all retired into different corners of the aerodrome, hangar and restaurant with C.D.C., slide-rule, pencil and paper, and ten fingers. The lowest result submitted was 30 lb. per square inch, the highest 60, so we decided to compromise at 45 and call it a day. Apparently the unexpected exit of the release valve had been too much for our poor oil gauge and the expansion chamber had collapsed inwards, so we had a "manometer" fitted, and flew the rest of the way home, showing a nice steady 2.8!

We landed at Nuremburg, and stayed the night and most of the next day at Frankfort, delayed by QBI at Cologne and Brussels. We took off for Brussels eventually, but by the time we reached the Rhine it was very black and beginning to close in on us, so we took to the water again and sailed up the river to Cologne, somewhat disconcerted by a Messerschmitt doing the same thing at the same height in the opposite direction.

We got back to Lympne (omitting to pay duty on our German oil gauge) in time for the International Air Rally, with only about fourpence in our pockets. The total expenses of our trip, including hire of the machine, exorbitant insurance rates, all running costs, landing fees, hangarage, etc., five days' hotel bill in Budapest, four days in Vienna, including hire of a car, all incidental expenses, cigarettes, drinks, tips, etc., amounted to £55 each. Our total flying time was 23 hours 40 minutes.

D.H. Surprise

SOMEBODY having let a carefully concealed cat out of the makers' bag, it is now permissible to disclose the fact that the De Havilland Company are designing a high-wing transport monoplane of medium-large dimensions—somewhere between the size of the D H.86 and the Albatross. It diverges from D.H. practice by being of all-metal construction.

Another interesting fact is that the installation of Bristol engines is being considered. The newcomer, it is stated, is intended for fast main-line work.

H.P. and the Doodle Bug

THE following, from *Aviation* (New York) deserves quotation: "The newspapers recently featured a picture of King George VI being shown through a British aircraft factory by Mr. Handley Page. They were looking at a model of a new bomber having Handley Page slots on the wings, which reminds us of a retort courteous but conclusive which we once overheard.

"When J. S. McDonnel flew his 'Doodle Bug' in to Mitchel Field for entry in the 1930 Guggenheim Safe Aircraft Competition, Mr. Handley Page looked the ship over and observed that it had his slots on the wings.

"'Young man,' said Mr. H. P., 'do you realise that you have infringed my automatic slot patents in building this airplane?'

"'Mr. Handley Page,' said Mr. J. S. McD., 'I estimate that I have infringed at least one hundred and seventy-eight patents in building this airplane.'

"Whereupon Mr. Handley Page laughed, slapped him on the back, and walked away."

Italy and South Africa

AN Italian pilot, Albertini, who left Milan on Thursday on his way to London to attempt a record London-Cape flight, crashed near Le Bourget the same day. He was unhurt, but the machine—a Caproni-Bergamaschi Libeccio (twin-engined trainer)—was wrecked.

The incident may have had some connection with a report of an Italian "demonstration flight" to the Cape, said to be a preliminary to the establishment of an air route. This report led Mr. Pirow, South African Defence Minister, to comment that the Government had adopted the principle of not allowing any civil air service into or over South Africa or South-West Africa except on the basis of reciprocity. The Belgian and Portuguese lines could come into the Union because there was actual reciprocity.

"Italy can never give us actual reciprocity," he said. "For the same reason no Dutch or German air service will be considered in any circumstances by the Government."

Rossi's Latest

FRANCE and Italy have lately been fighting a ding-dong battle in the record field. The latest effort is that of France's Major Rossi flying the shapely Amiot 341—one of the chief attractions at the last Paris Show—with two Hispano-Suiza series Y liquid-cooled engines. Major Rossi flew an out-and-home course from Oran, a distance of some 1,250 miles, at a speed of 271 m.p.h. with a load of two tons. This, when homologated, will constitute a record in Class C for a load of 2,000 kg. carried for 2,000 km. At the present time this record is held by Biseo and Castellani (Savoia-Marchetti S.79) to the credit of Italy.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

NO FIRE (BRIGADE) WITHOUT SMOKE

YOUR correspondent, Mr. A. J. Leland, makes a very good suggestion (for smoke-screening a city by chemicals burnt on domestic fires), but, unfortunately, it would only work in the winter, when such fires are burning, and even then not during the hours of nightfall.

The simplest of all methods of laying a smoke-screen quickly would not be by smoke-distributing aeroplanes, but by firing smoke-bombs from the ground to explode at 300 feet. Every fire-engine station would be equipped with an extra vehicle which could dash through the streets firing smoke-bombs from a suitably designed gun, and the already trained fire-engine personnel could drive round their area in a preset route and black it out completely in a very few minutes, repeating the dose on the windward edge of their territory as the wind necessitated.

A great advantage of this would be that at night-time the city would be completely concealed from view, and it would not need to extinguish its lights. CIVILIAN.

Cambridge.

A.C. IN THE AIR.

IN the correspondence columns of your issue of February 3, Mr. F. P. Wills, B.Sc., A.M.I.E.E., advocates the use of 120 or 140 volt A.C. current (360 or 800 cycles) on aircraft, used in conjunction with transformers.

The first point that the writer seems to have overlooked is that a battery, though "an old, conventional idea" is a necessity: neither should the battery be regarded as the supply of energy, but essentially as a reserve of energy.

The battery is required for supplying energy if the generator fails, for aircraft lighting, and for instruments such as fuel contents gauge, cabin temperature thermometer, etc., when the engines are not running.

The writer states that "aircaft motors can be started electrically, very simply, by the inertia starter via an electric motor running at 20,000 r.p.m. This is true, but again a battery is necessary as there would be no supply of A.C. until the engines were running.

We will suppose that a battery is incorporated in the A.C. supply, persist in the use of A.C. apparatus, and consider the engine starting problem.

The alternator supplies A.C. to a rectifier through which the battery is charged; it will probably be necessary to use a transformer also as a 120-240-volt battery is not a very practical proposition.

The battery would have to drive a motor-generator or a rotary convertor in order to supply current to the A.C. motor driving the inertia starter. The case above shows that D.C. is more suitable, using a dynamo to charge the battery and the battery to operate a D.C. motor direct for starting purposes.

The use of a voltage of 120-240 will not be so satisfactory as the writer would seem to think, from considerations other than that of the battery: —

(i) Granted there will be a saving in weight of copper, but there will be an increase in the insulation required to give the same margin of safety from fire and shock. As the supply is alternating, and assuming the voltage to be 240, insulation will have to be supplied to give protection from a maximum value of 340 volts.

(ii) The use of a higher voltage introduces the possibility of the pilots, crew or passengers getting shocks from the equipment they are using. This is impossible on a 24-volt system.

(iii) Filament-type lamps operating on the higher voltage would not last so long as there is still considerable vibration on aircraft, military types in particular, and the longer, thinner, and more fragile filaments would break under these conditions.

It is extremely doubtful whether all the instruments mentioned could be better worked from A.C. Petrol gauges must be able to indicate without the engines running; therefore they must be D.C.-operated for convenience. Temperature indicators and exhaust-gas analysers (combustion indicators) both require sensitive indicators, and there is no A.C. indicating instrument, including the rectifier-operated moving coil, which will give the same degree of sensitivity and economy as does the D.C. moving-coil indicator.

An external rectifier would therefore have to be used and this would certainly not make things any simpler.

Your correspondent suggests that magneto ignition could be dispensed with if the supply were A.C. One of the reasons why dual magneto ignition is used on aero-engines is from considerations of safety, i.e., if one magneto fails the engine can still run on the remaining serviceable one until such time as it is convenient to land.

If the ignition depended on the aircraft electrical supply this would require to be duplicated to give the same margin of safety. This would entail an increase in cost and also weight, as two alternators, giving the same output as a bigger unit, would weigh more.

It is agreed that all gyroscopes would function better from A.C. as they would then always run at the designed speed, and freedom from contacts and small brushes would be a boon in many ways. Air-driven gyroscopes are also apt to give false indications through lack of rotor speed caused by low vacuum or pressure due to "iced-up" venturis, leaky pumps and relief valves, etc.

All things considered, however, there does not seem sufficient reason for changing the main supply from D.C. to A.C. and in any case not to a voltage of more than about 30.

An auxiliary supply of A.C., either from the same generator or a separate one, for a few minor purposes where it is definitely more suitable, would be acceptable.

I might add that I am not a designer of aircraft electrical equipment and that I realise that for general purposes A.C. is superior to D.C. A.F.R.Ae.S.

Norfolk.

RADIO FOR THE PRIVATE OWNER.

IN Mr. Samuelson's letter in your issue of November 25, replying to my own earlier letter, he suggested that amateur pilots and private owners might make some suggestions in your Correspondence Page on the sort of radio equipment which they would like to see made available. Since then I have waited in vain for some fresh aspect of amateur requirements to be brought to light and have, very regretfully, come to the conclusion that the manufacturers, in apparently doing nothing about the whole business, are very accurately meeting the existing demand.

In spite of the evident lack of enthusiasm I still feel convinced that most people must at one time or another have felt the need of some means of getting in touch with the world outside their own small cabin or cockpit, and this aspect of the question is, I think, in many ways more important than the cold figures of D/F bearings or the almost equally cold and impersonal reading of the Borough Hill announcer.

We have most of us, at one time or another, received weather reports before starting, which have proved, on a closer and more personal investigation, to be more than a trifle astray. Weather forecasting is not as yet an absolutely exact science, and there are occasional days when changes can occur very rapidly indeed. It is in circumstances such as these that I suggest that the means of being able to call up one's destination, or some other useful point near the route, would be of very real comfort, as well as of considerable assistance. Exactly the same thing, of course, applies where sea crossings are concerned.

In the United Kingdom there are several hundred of machines in private hands—I hesitate to give an exact figure, since the position has had time to change a little since the last Civil Aviation Report came hot off the presses. Few of these machines are capable of carrying an extra heavy load, but a fairly large proportion of them should be able, without difficulty, to support a lightweight short-wave transmitting and receiving installation. This being so, and in spite of the lack of interest aroused by Mr. Samuelson's letter, it does seem that a tolerable proportion of the owners of these aircraft might be induced to buy installations, thus enabling the manufacture of such equipment to be carried out at a reasonable, although hardly a cheap, price. Aircraft screening and bonding is, of course, a very definite difficulty, but it has become a comparatively frequent operation on a number of small American aircraft, so that it should not prove impossibly expensive.

I am afraid that this very largely repeats what I said before, but I am still of the opinion that, were short-wave two-way communication provided for the private owners, together with some sort of an assurance that the question of short-wave D/F was being actively pursued, such equipment would find a ready demand from the public, limited though that public unfortunately is. JOHN CARR.

Belfast.

THE INDUSTRY

THOUGH no complete aircraft are on view this year, some sixty firms making aircraft constructional materials, components and accessories, or producing tools and equipment of special interest to the industry, are exhibiting.

These are mainly centred at the Castle Bromwich (Birmingham) Fair, though a few are in London (Olympia and Earls Court); some are exhibiting both in Birmingham and London.

At the B.I.F.

Exhibits for the Aero Industry

GROUP "A."

London Aluminium Co., Ltd. (A 411 and 310).
Salter, Geo. and Co., Ltd. (A 407 and 306).

GROUP "B."

Acrofilms, Ltd. (B 712).
Aero Research, Ltd. (B 233).
B.E.N. Patents, Ltd. (B 629).—Spray painting and air compressor equipment of many kinds.
Cellactite and British Uralite, Ltd. (B 625 and 522).
Cellon, Ltd. (B 529).
Guest Keen and Nettlefolds, Ltd. (B 524).
Terry, Herbert and Sons, Ltd. (B 424).
Valor Co., Ltd. (B 401).—The company are official contractors to the B.I.F., Birmingham section, for the supply of fire extinguishers, which will consequently be protecting hundreds of thousands of pounds' worth of exhibits. On their own stand they will show the steel office and works equipment for which they are equally well known.
Zinc Alloy Rust Proofing Co., Ltd. (B 714).

GROUP "Cb."

Bakelite, Ltd. (Cb 408).
Baldwins, Ltd. (Midland Branch) (Cb 312).
Birmingham Electric Furnaces (Cb 313 and 214).—The central feature will be a "Birlec" conveyor-type furnace for brazing and bright annealing, with ammonia burner; heat-treatment salt-baths will also be shown.
British Thermostat Co., Ltd. (Cb 700).—Thermostatic control devices of almost every imaginable kind, for industrial and other purposes, will be displayed.
British Thomson-Houston Co., Ltd. (Cb 507 and 404.)
Cable Makers' Association (Cb 401 and 300).
Chloride Electrical Storage Co., Ltd. (Cb 307).
Constructors, Ltd. (Cb 607 and 506).
Desoutter Bros., Ltd. (Cb 213 and 118).
General Electric Co., Ltd. (Cb 517).
Gilman, F. (B.S.T.), Ltd. (Cb 516).—This firm specialises in all types of flexible-drive, portable tools, and a new product which will be featured in a range of rotary milling tools of particular interest to engine manufacturers.
Lucas, Jos., Ltd. (Cb 501).
Metropolitan Vickers Electrical Co., Ltd. (Cb 220).
Philips Industrial (Philips Lamps, Ltd.) (Cb 712.—New spot-welding equipment, control units, rectifiers, etc.
Pitman, Sir Isaac, and Sons, Ltd. (Cb 115).
Rotax, Ltd. (Cb 501).—Rotax equipment, as fitted to the Empire boats and other famous aircraft, will be featured, and the display will include magnetos, starters, landing lamps and instrument-drive vacuum pumps; a prominent display of Rotax portable electric tools will also be made.
Rubery Owen and Co., Ltd. (Cb 705).
Standard Telephones and Cables, Ltd. (Cb 401 and 300).
Titanine, Ltd.
Wakefield, C. C., and Co., Ltd. (Cb 301).

GROUP "D."

Accles and Pollock, Ltd. (D 611 and 510).
Albion Drop Forgings Co., Ltd. (D 418).
Allen, Edgar, and Co., Ltd. (D 719)—"Stag" tools and tool steels will be shown and, for the first time, there will be a range of small castings in stainless and other steels.
Anglo-American Oil Co. Ltd. (D 306).—The company's exhibit will feature their jubilee as oil and fuel producers, and will include photographs and models.
Arens Controls, Ltd. (D 736).
Automotive Engineering Co. (D 205).
Bendix, Ltd. (D 428).
Blackburn Aircraft, Ltd. (D 729).
British Oxygen Co., Ltd. (D 411 and 312, and 212).—"Alda" oxy-acetylene welding and cutting equipment, stelliting equipment, brazing and soldering, leadburning; "Abla" acetylene flarelights.
Chance Bros. and Co., Ltd. (D 329).
Dunlop Rubber Co., Ltd. (D 511).
Esavian Doors (D, outdoor).
Felco Hoists, Ltd. (D 103).
Firth, Thos., and John Brown, Ltd. (D 619 and 518).—A comprehensive range of steel products will be shown, including examples of the application of tool steels.
Firth Vickers Stainless Steels, Ltd. (D 413 and 512).—"Staybrite" steel and Firth stainless steel, as supplied in sheet, bar strip, etc., to Air Ministry specification, will be shown.
Fletcher, Miller, Ltd. (D 208).
Fox, Samuel and Co., Ltd. (D 613 and 512).
I.C.I. Metals, Ltd. (D 403 and 302).—Brass and other alloys of copper; "Kynal" aluminium alloy in sheet and strip for aircraft construction.
I.C.I., Ltd. (Degreasing) (D 305).—Various types of I.C.I. degreasing plant for works and plating-shop use.
I.C.I., Ltd. (Heat Treatment) (D 206).—A working furnace demonstrating "Rapidleep" case-hardening compound will be among the exhibits.
Incandescent Heat, Ltd. (D 603 and 502).—Stand taken jointly with associated companies, Controlled Heat and Air, Ltd., Selas Gas and Eng. Co., Ltd., and Metalectric Furnaces, Ltd.: Industrial furnaces and ovens of all types will be shown, including a gas-fired furnace for all temperatures up to 700 deg. C., and widely used in the light metal industries.
M.C.L. and Repetition, Ltd. (D 466).
Moseley, David, and Sons, Ltd.
National Benzole Co., Ltd. (D 618).
Priestman, T. J., Ltd. (D 509).
Revvo Caster Co., Ltd. (D 331).
Reynolds Tube Co., Ltd. (D 623 and 522).
Rubery Owen and Co., Ltd. (D 703 and 602).
Silvertown Lubricants, Ltd. (D 310).
Simmonds Aerocessories, Ltd. (D 421).
Tecalemit, Ltd. (D 415 and 316).
United Steel Companies, Ltd. (D 613 and 512).—Display units for each group of the United Steels sections will tell continuous "stories" of the production of each type of steel, and films will also be shown. Samuel Fox's high-purity steels and stainless steels will be a prominent feature.
Vacuum Oil Co., Ltd. (D 419).
Wellworthy Piston Rings, Ltd. (D 229).

LONDON.

OLYMPIA OR EARLS COURT.

Imperial Chemical Industries (A 612 and A 626).
Jas. A. Jobling and Co., Ltd. (E 770 and A 783).
British Celanese, Ltd. (F 1420).
Ebonestos Industries, Ltd. (A 703).
F. A. Hughes and Co., Ltd. (A 703).
Insulators, Ltd. (A 698).
Bakelite, Ltd. (A 684).
Mouldrite, Ltd. (A 676 and 688).
Air Ministry Civil Information Bureau (Earls Court 274).
Short and Mason, Ltd. (A 653).

Both Fairs open next Monday, February 21, and remain open until March 4. Admission is by season ticket (2s.), obtainable on production of a business card, or, in the case of non-trade visitors (admitted only at certain times) at 2s. single.

Below is a list of firms of particular interest to the aeronautical industry, arranged under the sections in which they are exhibiting. Brief details are given in the case of those who have advised us of their intentions.

Neat and nicely finished: The Rotax floodlight.

NEW PORTABLE FLOODLIGHT

ILLUSTRATED here is a new item of aerodrome equipment, ingeniously designed and finely made, which is now being marketed by Rotax.

Known as the Rotax-Harley portable floodlight, it consists of an 11 in. 250-watt Harley lamp carried on gimbals at the top of a 5 ft. column mounted on a light but sturdy three-wheel pneumatic-tyred and sprung trolley. Also carried on the trolley are dual storage batteries to provide current for the lamp, and a self-contained petrol-electric generator set to charge them.

Primarily intended for use on emergency or temporary landing grounds without other lighting equipment, the beam of the lamp can be directed accurately up-wind; the position of the light will mark the boundary, and the pilot can safely land alongside the beam without being dazzled. Economy in operation is a feature.

Other obvious uses for the light are (a) in the event of a crash; and (b) for performing emergency repairs when it is impossible to bring the aircraft into a hangar.

Further details are obtainable from Rotax, Ltd., Willesden Junction, London, N.W.10.

THE INDUSTRY (CONTINUED)

Plugging the Composite

THE other Sunday those two popular pilots Parker and Piper broke all world's records by using (i.e., "fitting and forgetting") more plugs than any aircraft has ever used in the history of flying. Whatever one would say at a quick guess, the fact remains that the number of plugs in the Short-Mayo composite is 200! Sceptics may count them up: The four Napier-Halford Rapiers have 16 cylinders each, or 64 cylinders with two plugs in each; total 128. The four Bristol Pegasus engines have nine cylinders each, or eighteen plugs per engine; total 72. No wonder the K.L.G. firm hopes the composite will become popular!

Big Motor Boats for R.A.F.

SAID to be capable of cruising at 36 knots for a limited period, seven 64ft. motor boats have been ordered for the R.A.F. from the British Power Boat Company. The seven are additional to three already in service.

With 1,500 h.p. engines, the craft are similar to the Naval motor torpedo boats, and have the same extreme seaworthiness and high standard of comfort for the crews. They will presumably be used for rescue work and general duties, among which might be the carrying of spares and equipment for flying-boat units on cruises or operating at a distance from their bases.

Works Equipment on Show at Leipzig

PRODUCTION managers visiting Leipzig Fair will find that the Bosch concern have a special display of high-frequency tools arranged for continuous working so that the visitor can seen them demonstrated on the class of job in which he is particularly interested.

The exhibit will include a tool for drilling ¼ in. to 2 in. holes in steel, a tool for inserting studs, and a nut driver. This last-named tool has a built-in reverse switch for unscrewing nuts. There will also be shown reamers, grinders, tapping tools tube expanders, sanders, hand-motors for rotary filing, and screwdrivers.

Bosch products are handled in this country by Bosch, Ltd., Larden Road, Acton, London, W.3.

Factory Cycle Parking

AMONG the problems that arise in the equipment of a new or extended aircraft factory is that of storing workers' bicycles. The cycle of the worker means as much to him as does the car to the manager, and adequate protection should be provided for it.

This problem has been tackled and met by Constructors, Ltd., Nickel Works, Tyburn Road, Erdington, Birmingham. The cycle parks designed by this firm occupy the minimum of space and provide the maximum capacity. A park for a double row of cycles occupies a width of only 7ft. 8in., and cycles are parked with a distance from centre to centre of each cycle of only six inches. The construction is of steel throughout, maintenance charges are practically non-existent, and many different types are available, covered, uncovered, and totally enclosed.

Colleague for "Chris"

THE portrait is that of Mr. Owen Maclaren, B.A., who has joined the aviation department of the Anglo-American Oil Co., Ltd., to assist Flt. Lt. Christopher Clarkson with the company's rapidly expanding aviation activities. Educated at Marlborough and Cambridge University, Mr. Maclaren joined the Cambridge University Air Squadron when it was founded in 1927, and is still a member of the R.A.F. Reserve. He was for a time in partnership with Mr. M. D. L. Scott in the operation of Skegness Aerodrome, and has latterly been assistant instructor at Hatfield. In the course of his new duties, and on Anglo's own aircraft, Mr. Maclaren will add to his already large number of flying hours, which totals some 2,500.

Mr. Owen Maclaren.

Death of Capt. P. Phillips

FLIGHT greatly regrets to record the death of Capt. Percival Phillips, D.F.C., R.A.F.O., managing director and chief pilot of Air Publicity, Ltd. It appears that Capt. Phillips, on his way home to Heston from banner-towing work at Hull, put his 504 Avro down in a field at Gamlingay, between Bedford and Cambridge, in order to call upon friends for lunch. In taking-off afterwards in gusty weather the machine struck a tree top, hit the ground, and caught fire.

Capt. Phillips.

Capt. Phillips, who had been with Air Publicity since their inception in 1935, was formerly managing director of C. W. A. Scott's Flying Display, and had safely carried many thousand passengers as a joy-ride pilot. During the war he had seen flying service in Iraq and elsewhere.

Last summer, flying a veteran Lynx Avro used daily for banner towing, he won the Devon Air Race. Those of us who met him on that occasion and elsewhere recall him as a particularly charming and modest man, with an almost boyish zest for flying which belied his 45 years. To his equally sporting and enthusiastic wife—who was his passenger in the Avro during the Devon Race, and on many other flights—and to his two children, *Flight* extends most sincere sympathy in their loss.

International Aircraft Directorships

WE are informed by Sir Charles Rose and Mr. W. J. Leeming that they have resigned their directorships of International Aircraft and Engineering, Ltd.

Alvis Pelides Type-tested

AS we go to press it is learned that the Alvis Pelides has passed its civil 50-hour type test. The Pelides is a two-row, fourteen-cylinder radial of 38.5 litres capacity. Established power figures are as follows: Normal output, 1,025/65 b.h.p. at 5,000ft. and 2,150 r.p.m.; maximum output, 1,045/85 b.h.p. at 5,750ft. and 2,250 r.p.m.; take-off output, 1,060 b.h.p. with +3½lb./sq. in boost.

Bendix European Representative

APPOINTMENT of Mr. H. F. McEnness as special European representative for the Bendix Aviation Export Corporation, and the opening of a new Paris office at 51, Avenue George V, are announced. Travelling out of his Paris headquarters, Mr. McEnness will cover the Continent, the British Isles and the Near East.

During recent years he has handled all foreign business for the Pioneer Instrument Co., a Bendix subsidiary.

Changes of Address

MAKERS of undercarriage and other equipment under the French Messier patents, the Messier Aviation Engineering Co., Ltd., have moved to 52, Grosvenor Gardens, London, S.W.1 (Sloane 3860).

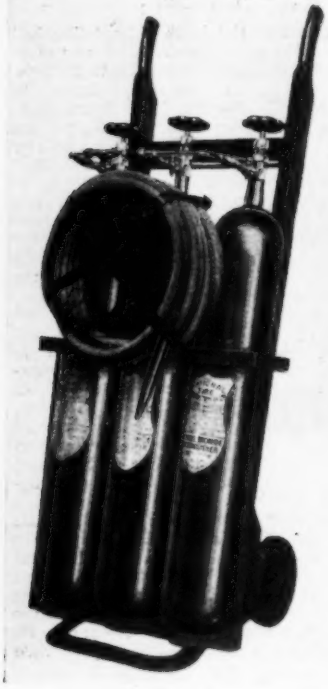
Manufacturers of the Cambridge exhaust-gas analyser and other aircraft and industrial instruments, the Cambridge Instrument Co., Ltd., will move its head office and showrooms from 45, Grosvenor Place, London, S.W.1, to 13, Grosvenor Place.

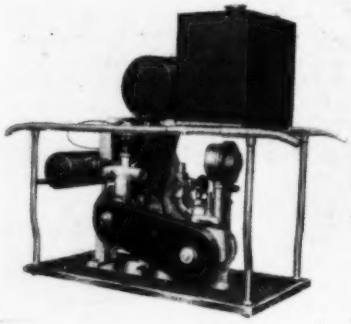
Hatfield to Hyde Park

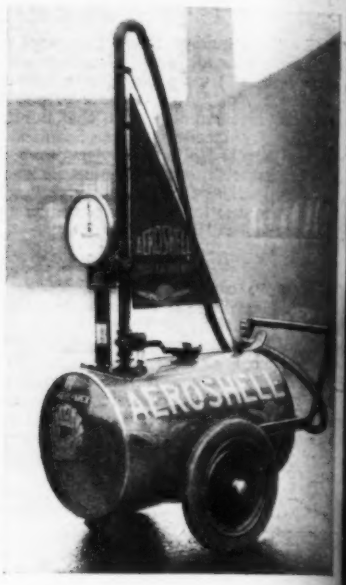
MANY aviation folk of various degrees of notability were to be seen enjoying themselves at the annual ball of the De Havilland Technical School, held at the Hyde Park Hotel, London, last Friday; and with the Principal, Sqn.-Ldr. Owen Clapp, as host, and with Mr. Leonard Henry to put the right complexion on things, the party was assured 100 per cent. success from the start.

Incidentally, the 167 pupils of the School are now installed in their new premises, inspired, we hope, to even greater efforts in their modern drawing office, engine test house, laboratory, and so forth.

THE INDUSTRY (CONTINUED)







CAUSE AND EFFECT?
Three new items of aerodrome equipment, in possibly sinister, but undoubtedly appropriate, juxtaposition.

(Above) Portable "Air-foam" generating unit for fire-fighting, by Auto Fire Protection, Ltd., 64, Victoria St., London, S.W.1.

(Left) And another: Essex methyl-bromide "triple truck" (National Fire Protection Co., Ltd., Richmond, Surrey).

(Right) The Shell-Mex "Meta" oil-dispensing unit. It supplies 50 gallons at 3 galls. per min.

West London Service

FOR the sale of their numerous "lines" in the westerly districts of London, Brown Bros., Ltd., have opened a large new building in First Avenue, The Vale, Acton. Orders for Brown Bros. (Aircraft), Ltd., can be accepted there.

Instrumental Celebration

THE first annual dinner and dance of the "Sestrel" Social Club—composed of the employees of Henry Browne and Son, Ltd. the aeronautical instrument makers, was held at Barking recently. Mr. F. G. Browne, managing director presided.

Discussion on Magnesium Alloys

AMONG the papers to be discussed at the annual meeting of the Institute of Metals is one on the "Mechanical Properties of Magnesium Alloys." It will be presented on March 9 by J. M. Haughton and A. E. L. Tate. Full details of the meeting (to be held at the Institution of Mechanical Engineers) are obtainable from the Institute of Metals, 36, Victoria Street, London, S.W.1.

Mr. P. F. Bennett and the F.B.I.

THE Grand Council of the Federation of British Industries have nominated Mr. Peter F. Bennett, O.B.E., J.P., as president-elect. Mr. Bennett, who is chairman and managing director of Joseph Lucas, Ltd., has long taken a leading part in the work of the F.B.I., and during the past year he has been assisting the president, Lord Hirst, as deputy president. He was recently appointed to preside over the special committee considering the question of the location of industry.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

J. HIXON, LTD. Private company, registered February 1. Capital £100 in 100 shares of £1 each. Objects: To carry on the business of mechanical, general, aircraft electrical, radio engineers and contractors, constructors of electrical machinery, etc. The first directors are to be appointed by the subscribers. Registered office: Hanover House, 14, Hanover Square, London, W.1.

BADDESLEY AIRCRAFT, LTD. Private company, registered February 2. Capital, £10,000 in 100 preference shares of £5 each and 380 shares of £25 each. Objects: To carry on the business of manufacturers and repairers of and dealers in flying boats, seaplanes, and aircraft of all kinds, etc. The subscribers are Geo. B. Miller, A.M.I.C.E., and Mrs. Lettice M. Miller. Registered office: St. Christopher Works, Thomas Road, North Baddesley, Southampton.

MIDLAND BANK FLYING CLUB, LTD. Private company, registered January 27. Capital, £100 in 50 shares of £2 each. Objects: To establish and maintain a club to be known as the "Midland Bank Flying Club." The directors are: Clarence T. A. Sadd, George A. Castle, and William Dawkes. Solicitors: Baddeley Wardlaw and Co., 77, Leadenhall Street, London, E.C.3.

V.D.M. SPINNERS, LTD. Private company, registered February 9. Capital, £1,000 in 1,000 shares of £1 each. Objects: to carry on the business of manufacturers of and dealers in spinners for airscrews, and propellers and parts, components, accessories and engines used or required in connection with aircraft, etc. The first directors are: Major James Galloway and Reginald R. M. Channell (both directors of Constant-Speed Airscrews, Ltd.). Registered office: Avon Works, Wharf Street, Warwick.

PUBLICATIONS RECEIVED

Famous Aircraft by H. Coble and A. R. Payne 6s. W. and R. Chambers Ltd., 11, Thistle St., Edinburgh and 38, Soho Square, London, W.1.

The Airman's Diary 1938 1s. 6d. George Newnes Ltd.

Stannic Oxide as Opacifier in Wet Enamels, by Dr.-Ing. L. Stuckert. International Tin Research and Development Council, 378, Strand, London, W.C.2.

An Introduction to Aeronautical Engineering: Vol. 1—Mechanics of Flight, by A. C. Kermode, 6s. 6d. 3rd edition. Sir Isaac Pitman & Sons, Ltd.

Jane's All the World's Aircraft, 1937, compiled and edited by C. G. Grey and L. Bridgman, £2 2s. Sampson Low, Marston and Co., Ltd., 100, Southwark Street, London, S.E.1.

Aeronautical Research Committee Reports and Memoranda: No. 1781: Measurements of the Water Resistance of a 1/2.4 scale Singapore II c Hull, by J. L. Hutchinson, 2s. 6d. No. 1782: Calcaluated Flexural-Torsinal Flutter Characteristics of Some Typical Cantilever Wings, by W. J. Duncan and H. M. Lyon, 4s. 6d.

No. 1783: Note on the Whirling of Radial Engines on their Mountings: Mathematical Analysis and Experimental Observations, by B. C. Carter, 3s. 6d. No. 1784: Tests of the N.A.C.A.-H-A Model Hull in the R.A.E. Seaplane Tank, by L. P. Coombes and F. G. Brown, 2s. No. 1785: Comparison of Results of Tests of the Singapore II. c. Model Hull in Five Tanks, by J. P. Gott, 2s. 6d. No. 1786: A Review of Theoretical Investigations of the Aerodynamical Forces on a Wing in Non-Uniform Motion, by H. M. Lyon, 4s. 6d.

No. 1789: Tests on Rivets and Backward-Lapped Joints, in the Compressed Air Tunnel, by D. H. Williams and A. F. Brown, 1s. 3d. No. 1790: The Influence of End Constraint on the Torsional Stiffness of a Rectangular Section Tube, by J. C. K. Shipp, 1s. 3d. No. 1791: The Development of a High Speed Induced Wind Tunnel of Rectangular Cross-Section, by A. Bailey and S. A. Wood, 2s. 6d. No. 1792: Note on the Drag of a Gauntlet as Measured in the 24ft. Tunnel, by W. G. Jennings, 1s. 6d.

H.M. Stationery Office, London, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.):

(*Published February* 17, 1938.)

14074. MITCHELL, C. C.: Devices for accelerating aircraft for launching purposes (478,427).

19638. STONE AND CO., LTD., J., and LYTH, C. J.: Machines for machining propeller blades (478,569).

19832. GARDEN, A. D.: Wings and like supporting surfaces of aircraft (478,396).

20043. COWDREY, C. L., and TATE, J. W.: Cowlings for aircraft and other vehicles (478,365).

20137. COLE, J. H., and COLE, E. J.: Variable-speed gears (478,705).

20123. AUTOMOTIVE PRODUCTS CO., LTD., and BOUGHTON, E. B.: Resilient struts, more especially for use in connection with the landing wheels of aircraft (478,591).

20263. WALWIN, W. R.: Registering engine-running periods for use on aircraft, and for like purposes (478,658).

20507. SILENTBLOC, LTD. (Thiry, Ltd.): Apparatus for transmitting power from a propeller-shaft to a propeller (478,676).

25251. SEDLMAYR, G. (Trading as AUTOPLUG): Parachute (478,384).

30264. GLOSTER AIRCRAFT CO., LTD., and BIRT, R. F.: Riveting tool (478,538).

1960. LORENZ AKT.-GES., C.: Radio-goniometers (478,395).

8888. STANDARD TELEPHONES AND CABLES, LTD.: Radio-directing and direction-finding systems (478,470).

12153. CAPEL, L. J. M.: Parachutes (478,476).

21876. SPERRY GYROSCOPE CO., INC.: Repeater compasses (478,420).

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